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STATE OF NEW YORK

REPORT

OF THE

COMMISSIONERS

OF THE

State Reservation at Saratoga Springs

1914

TRANSMITTED TO THE LEGISLATURE JANUARY 21, 1914

ALBANY
J. B. LYON COMPANY, PRINTERS
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STATE OF NEW YORK

No. 10.

IN SENATE

January 21, 1914.

Annual Report of the Commissioners of the State Reservation at Saratoga Springs.

To the Honorable the Legislature:

The Commissioners of the State Reservation at Saratoga Springs respectfully make report of their proceedings since their last report, submitted in March, 1913.

Following the submission of that report, the Legislature again passed a bill appropriating an additional sum of $100,000 for the acquisition of property. Governor Sulzer vetoed this item, as had been done with a similar item in 1912. This second failure to provide necessary funds prevented the Commission from acquiring property which was needed.

The Board of Claims has not yet heard the claims of the owners of property taken. The Commissioners, however, have been able during the year to reach agreements as to compensation with owners of important properties at prices which they deem fair and equitable to the State and the claimants. The compensation agreed to be paid aggregates a total of $301,250, as set forth in the statement on page 23. This amount, added to the sum of $158,960, as per the previous report, makes the total compensation agreed upon to date $760,210. The owners of the remaining properties taken still claim values which are, in our judgment, so excessive as to preclude our making agreements with them as to compensation.

We call the special attention of the Legislature in this connection to the fact that, in addition to the agreed compensation paid to the owners, the Comptroller has to pay from the fund appropriated for such acquisition, accrued interest and expenses to an aggregate amount of $104,314.39, and there is, in addition, already accrued, interest upon claims not yet settled which will aggregate $20,000 more, so that the fund intended by the Legislature to pay for the value of properties taken has thus far been reduced from $950,000 to $825,000.

This reduction has resulted in part from delay in paying claims after settlement by the Commissioners, and the latter amount will suffer further and important reduction since interest is accruing day by day upon claims, the amount of which has been settled but not yet paid, as well as upon the unsettled claims. The Comptroller has no other funds from which to make these payments for interest and expenses.

The Magnetic Spring Bath House was during the past year leased to Mr. C. H. R. Compton, who was also the lessee of the Saratoga Spa Baths, for which the State supplied mineral water from the Hathorn Spring. It was necessary for the State to make further expenditures to keep the Magnetic Spring Bath House in condition to continue the giving of baths. Although this house is small, old and unsuitable, the experience acquired by the Commissioners during the year makes it evident to them that some further outlay should be made to indicate how much better and more effective the baths may now be made with appliances less crude than those at present in use. The lessee reports an increase of over 20 per cent. in the number of baths given, showing how prompt is the response to even a meager opportunity for taking these mineral water baths.

The lease to Hathorn & Company of the right to bottle and sell mineral water was continued. Although conditions were in no wise improved as to the outside sale of the waters because of the inability of the lessee to advertise and push the business with a lease terminable on ninety days' notice, yet the lessee was able to make a sufficient profit to wipe out the loss suffered in previous years, which had to be carried by Hathorn & Company until extinguished by profits. It is not to be anticipated that anything more than nominal profit can be made until permanent conditions are established for the various springs.

The Commissioners report with special satisfaction that they secured, during the past year, the assistance of Dr. Albert Warren Ferris as Medical Expert and Adviser, and in effect as Superintending Director of the work now incumbent upon the Commission. The Commissioners serve without any compensation for their time. They found that the work continually called for more thought and also constant attention. It has enlarged to such a degree that they needed the assistance of some one of exceptional breadth of education and experience who could handle the great variety of questions which have developed in the course of their four years of study of this problem. Dr. Ferris' wide and varied experience, including experience in the administration of institutions designed for the treatment of diseases and the promotion of the public health, and his exceptional knowledge of men and affairs give him special fitness for the study of this problem and the preparation to meet with an open mind the various and intricate questions involved in this new enterprise of the State. The Commissioners have felt, during the last few months, when they have had the counsel and assistance of Dr. Ferris, that they were more than fortunate in inducing him to resign an important position, where he had a most promising field for service and study, in order to serve this great cause of health conservation. Dr. Ferris' large acquaintance throughout the State, and in fact throughout the country, and as well abroad, has already proved of the greatest service, and we are confident that he will be able to give us the aid necessary to meet and deal effectively with the many aspects of the problem committed to the Commission.

The Commissioners have been able to make certain developments, investigations and experiments in connection with some of the recovered wells in the Geyser Park district. Some of these have entirely changed in character since the period of their former activity, and the present conditions warrant the strong belief that the State will develop there most desirable table waters. There seems no reason to doubt that as soon as we have the funds to put into force the improved methods which our studies in Europe are making known to us as necessary, we shall be able to put upon the market table waters for which there should be widespread demand and which will greatly broaden the reputation of Saratoga Springs as possessing the most varied assortment of mineral waters known. These are the first natural mineral table waters which the State has developed in Saratoga Springs. They should supply a large portion of the demand which calls each year for the importation of so many million bottles of French and German table waters.

In the report of the Commission, submitted in May, 1911, it was shown that the French government received a very large revenue from its mineral springs at Vichy; and the company which leased and operated the same made an even larger sum for itself, from which it was able to pay 16 per cent. on a capitalization of several million dollars after liberal allowance for depreciation.

We beg to refer to the statement in the report submitted in 1911, that the municipality of Nauheim borrowed from the State two million dollars in 1904, on which, beside paying interest and setting aside within five years nearly 20 per cent. toward paying off the debt, they paid $25,000 a year as bonus to the State; also, that the municipality of Carlsbad found the business of a mineral water health resort so profitable as to warrant the issue of bonds for ten millions of marks to make additions to their plant, although the springs had been known for more than five hundred years.

We think it important that we ask you to re-read the following from the same report respecting Harrogate in England:

"No better example of the profitable results from the expenditure of money in developing a mineral water region could be shown than the history of the municipality of Harrogate, in England, which has rapidly risen in a few years to be one of the leading health resorts of England. In 1841 Harrogate had 4,000 inhabitants. In 1890, or about that year, it had increased to 9,000 — a fair commentary on the lack of a "boom" during that period. It is at about the latter date that the town woke up. It was decided to borrow money and build bathhouses and a kursaal that would be up to date. Parliament had already granted the Council of Administration the right to borrow to improve the springs. In all $1,780,000 was borrowed, divided (quoting from the official figures furnished the Commission by the town treasurer) about as follows:

Baths and mineral water reservoirs, wells and pump-rooms, including additions to the "Royal Baths," now approaching completion, approximately.....	$1,055,000
Pleasure gardens, including the kursaal (concert hall) and grounds	725,000

So much for what was done. Now for the results:

"Quoting again from the official figures of the town treasurer and taking the last three years in order to avoid a big season or a poor season and to get a fair average, all expenses of running the property, including heavy taxes, amounted to $354,205. All receipts from the sale of water by the glass and from the baths amounted to $558,865, making the net profit over the cost of maintenance $204,660. Of this amount $103,855 was paid as interest on the constantly decreasing indebtedness and $70,115 applied to the sinking fund. In twelve years more the total debt will have been paid, and the profits, it was estimated by one of the officials, will pay nearly all the taxes of the place."

We have not the latest figures from Harrogate, but we call your attention to the fact that in nine years from now the total debt of $1,780,000 will have been paid from the profits of the enterprise and that thereafter the profits, as was estimated by one of the officials of the city, will suffice to relieve the city from nearly all its taxes. In this connection we cite that in 1890, when Harrogate determined to take this important forward step, the population was 9,000, whereas it is now over 35,000.

The Commission was so fortunate as to have Professor Simon Baruch, M.D., of the College of Physicians and Surgeons, Columbia University, become so interested in the State's development at Saratoga Springs as to offer, without charge to the

State other than his actual traveling expenses in Europe, to investigate and report as to the present condition from a medical point of view of the English and Continental spas of principal importance. The Commission paid the expenses of a young physician who accompanied him as his secretary to make very full notes with ample illustrations by photograph and cut; so that, in addition to the oral reports from Dr. Baruch and the conferences which the Commission has had with him, it has a permanent record of his investigations with illustrations.

We have been interested, in comparing this with the report made by Mr. Howe in 1910, to notice the steady progress of these great resorts in popularity and in the profit of the business.

The Commissioners beg here to make formal recognition of Dr. Baruch's notable public spirit and extreme courtesy and consideration, and express their earnest thanks to him for the exceptional and most valuable service rendered by him to the State and the country.

Dr. Baruch, among other things, noted while at Bad Kissingen exceptional indications of efficiency in construction, organization and management, and discovered that the Royal Bavarian Government had placed in charge of the laboratory and direction of the government's enterprise at Bad Kissingen, Paul Haertl, Ph.D., a scientist of notable genius, whose accomplishments had already become conspicuous. Dr. Baruch at once arranged with Dr. Haertl to come to Saratoga Springs, provided the consent of the Royal Bavarian Government could be secured. Your Commissioners thereupon addressed a communication on behalf of the State to the Royal Bavarian Government, which was seconded by the United States Department of State, requesting leave of absence to Dr. Haertl for a visit to Saratoga Springs to make an inspection of the property of the State and give counsel to the Commission, which was granted.

Dr. Haertl came, and as he had made a very thorough study, with exceptional equipment and facilities furnished by his Government, of the whole question of mineral water supply and development, he was able to give to your Commissioners much information respecting the value and possibilities of the properties taken by the State.

The Commissioners have sent to each member of the Legislature some brief newspaper reports respecting Dr. Haertl's observations and conclusions, but deem it necessary to insert here for permanent record the following from his reports to this Commission:

"The system of piping now in use is very primitive and it is remarkable that such good results have been achieved under such unfavorable conditions and at so small expense. The wrought iron pipes now in use are absolutely forbidden by law in Germany for conducting mineral waters containing carbonic acid gas, because the gas causes a steady and permanent corrosion of the iron which not only injures the pipes but also produces a chemical decomposition which changes the character of the water and makes it injurious to health. There are also liberated gases which impart a positive odor to certain of the waters. Moreover the small diameter of the pipes is extremely unfavorable to the maintenance of the proper proportion of carbonic acid gas and water, because a narrow pipe favors an immense loss of carbonic acid gas through friction which deprives the water of the necessary gas content. The best material for pipes which conduct carbonic acid waters is phosphor-bronze. Pure electrolytic copper is the second best material. These two materials are the only ones that can be depended upon to convey carbonic acid water without corrosion and it follows that the present piping should be replaced *at once.*

* * * * * * * * * *

"In view of the fact that about 15 years of pumping has not exhausted these springs beyond restoration, I am confident that the more moderate usage of the water for therapeutic purposes *can never exhaust the supply.* The methods which I have suggested for conserving the gas, namely larger bores, pipes and the closing of unnecessary artesian and other openings, etc., offer an additional warrant for this view. These considerations justify the opinion, which I do not hesitate to pronounce, that future demands upon the springs which are certain to arise when Saratoga becomes the renowned health resort which its mineral springs and environment promise, will be amply responded to by the natural supply of water and gas within its subterranean area. Many European health resorts are engaged in an effort to respond to the increased demand upon their water and gas supply which gives them great anxiety, and Saratoga is very fortunate in having a supply so abundant that only intelligent methods will be necessary to meet every demand; and for this reason *I advise that the present outlay be ample* to prevent future contingencies from demanding in the end a much greater outlay as is now frequently occurring in the cases of some of the European springs."

Dr. Haertl entirely confirmed the general theory of ground water and hydrostatic pressure as elaborated by the Honorable Charles C. Lester and used as a working basis by the Commission. It was the good fortune of the State that the Commission was able to secure Judge Lester as its legal adviser because, in addition to his wise counsel as regards the many legal questions that have confronted the Commission, his familiarity with conditions and his own scientific knowledge of chemistry and geology have made his services invaluable.

Dr. Haertl's visit and explanation of conditions abroad, which were made more graphic through photographs and drawings, confirmed the Commission in its opinion that the exploitation of the mineral waters of Saratoga Springs had been crude and unscientific; that there had been an absence of any scientific method based on the idea of permanence, and only a process of getting everything possible for the day without any real consideration for the morrow. This was the most obvious and inevitable consequence of divided ownership. The interest of each owner led him to resort to any and every expedient to obtain the greatest possible flow of water from his own well, without regard to his neighbor or the general situation or the conservation of the mineral water supply.

The Commissioners have found that the iron pipe which had been used for tubing is not only unsuitable and injurious to the mineral waters, but very uneconomical from every point of view. Dr. Haertl reported that all the springs under his charge were using phosphor-bronze and wooden or wood-lined pipes for the various uses to which pipe is put. Dr. Haertl also indicated a new and greatly improved method of properly conserving and handling the artesian wells from which waters are obtained for bathing.

The knowledge acquired by the Commission through Dr. Haertl was not only of the great value already indicated, but was unanswerable confirmation respecting the inestimable value of the properties already acquired by the State. It is entirely clear to your Commissioners that, although the State is paying fair and full prices to the individual owners for their properties, they will, beyond any doubt whatever, become under the unified ownership of the State, when properly developed, of many-fold value measured by the profits they will produce. It is also beyond question that, while the annual profits should be in due time very large, as indicated, yet the further profit to the State from the conservation of the health of its people and of those who will come to utilize its waters is of far greater importance.

The most important and far-reaching result of Dr. Haertl's visit was to confirm fully the opinion of your Commissioners that all the Saratoga mineral waters are suitable for bathing. Mineral water baths are given at many scores of places in Europe, which have very large establishments, the aggregate cost of which is over fifty millions of dollars. These establishments are practically all paying handsome returns on the investment.

It is conceded by all who have looked into the question that in combined variety, quality and quantity the mineral waters at Saratoga Springs are much beyond those of any other resort. The carbonic acid gas is one of the most important therapeutic agents in mineral waters, whether used for drinking or bathing, and in respect to this Saratoga Springs is easily first.

Your Commissioners, therefore, report that there is no doubt as to the necessity for the early construction and equipment of large and important facilities for properly utilizing these waters. There must be large and costly drink halls with modern conveniences for supplying the different waters under one roof and for properly heating them to the varying temperatures at which physicians prescribe them for drinking. It is absolutely imperative to build luxurious and expensive bathing houses equipped with all the modern facilities and appliances for the use of the waters in bathing, as well as for the incidental treatments employed in connection with them, upon a scale comparable with the great and enormously profitable establishments of Europe.

This means a very large outlay of money to secure suitable returns both in pecuniary profits and in the restoration of health to individuals. We have heretofore cited to you the outlays made at various places in Europe, and we call to your attention now the fact that, upon the recommendation of Dr. Haertl, the Royal Bavarian Government, through its Legislature, appropriated in 1909 the sum of six million marks, or one million five hundred thousand dollars, to add to the facilities for bathing and drinking in the city of Bad Kissingen. The immediate results of this additional expenditure were so satisfactory that it is proposed to spend one million marks more during the current year to make further additions.

The conditions as to supply at Bad Kissingen are greatly different from those at Saratoga Springs. At Bad Kissingen, it was necessary in order to secure an additional supply of water to sink one well 3,000 feet at a total cost, including equipment, of nearly 300,000 marks. The conditions in the New York State Reservation, on the other hand, are such that we shall have to close up perhaps one hundred wells or more in order properly to conserve the water in the remainder, in all of which wells the mineral waters flow from veins 150 to 600 feet below the surface.

The need for so large a development of this property by New York State makes it incumbent upon your Commission to give further and more careful study to the conditions which surround the foreign spas and also to the proper equipment and development of the property now under their charge. The Commissioners have therefore recently sent to Europe Professor Charles G. Anthony, consulting engineer, of the faculty of Union University, to secure accurate data respecting the comparative local conditions, mechanical devices and methods and various technical matters concerning piping and connections and other features of the most up-to-date installations. Professor Anthony will visit the several most successful resorts, giving his concentrated attention to these immediate, practical, constructive points. He will investigate the question of phosphor-bronze and other piping and securing the same, because there *should be no delay* in our promptly removing from the wells in use the iron pipes, which are so rapidly disintegrating, and in properly equipping them in the most modern and permanent manner.

Your honorable body will perceive from the foregoing that the Commissioners present to you a situation which makes it imperative for the State of New York now to empower them to go forward at once and take certain properties that are immediately necessary in view of the further knowledge gained through Dr. Haertl's study and counsel and from the experience of the Commissioners, so that the further development of the property already acquired may not be hindered. Until these properties shall be acquired, the work of the Commission must be practically at a standstill.

We repeat that the original fund of $950,000 put at the disposal of this Commission has been depleted to the extent of as much as $125,000 for interest and expenses, with continuing accruals of the same character, thus leaving only $825,000 applicable to payment of the original values of the properties acquired. The first report of this Commission advised the Legislature that the fund should be $1,500,000 to cover the values of the necessary properties as then estimated. It is not at all improbable that in time the further development of the State Reservation here may require that amount; but at the present time your Commissioners believe that the amount of $1,175,000 in the aggregate, or the further sum of $350,000 in addition to the $825,000 applicable as stated above, will be sufficient, *if immediately appropriated,* to enable them to acquire now the properties which in their judgment should be taken without further delay. We therefore ask that not less than that sum be placed at the disposition of the Commissioners before the end of January to enable the work to go forward promptly.

We further submit that there is *the same urgency* for an immediate appropriation of $100,000 for the purposes of further investigation and expert study of the various aspects of the problem committed to this Commission and for the proper maintenance, administration and protection of the properties taken and the supply of free service to the public. The Commissioners are unable to advise you that any less sum will be sufficient to enable them properly to do the work that should be done immediately and throughout this current year. In order to have the mineral waters properly supplied during the coming spring, the Commission should be in a position to cable orders to Germany this month for the necessary phosphor-bronze pipe, as we find American manufacturers are unable to supply the State with what is needed. It is necessary, also, that the experts now at work for the Commission should continue their services, which are becoming increasingly valuable by reason of their fuller knowledge and greater familiarity with the conditions and problems.

The Commissioners have endeavored to make this report as brief as possible in order to concentrate attention upon the urgency of the requirements of this work. They will hope before the session shall have ended to submit some further considerations respecting the conditions and prospects and particularly will expect to submit the reports as to the most suitable policy and program for the State in connection with the proper conservation, utilization and development of this property by the construction of the necessary bathing and drinking houses, either by the State itself, to be hereafter leased, or by lease to a corporation to make the investment. It seems conclusive from the experience of other countries that the latter course would be far less profitable — probably bringing not one-half so satisfactory a return as the former.

The Commissioners beg to express their appreciation of the courtesy and consideration which they have received from His Excellency, the Governor.

They also beg to express their appreciation of the continued interest and courtesy and careful and continuous attention of the Commissioner of the Department of Health and his staff to the most important matter of analyzing and reporting respecting the mineral contents of the waters, as well as their obligation to the municipal authorities of the village of Saratoga Springs and to the Commissioner of Parks of the village, for cordial and efficient co-operation, and constant interest.

GEORGE FOSTER PEABODY,
FRANK N. GODFREY,
BENJAMIN F. TRACY,
Commissioners.

Saratoga Springs, January 15, 1914.

Report of the Superintending Director.

January 15, 1911.

To the Honorable, the Commissioners of the State Reservation, at Saratoga Springs, N. Y.:

GENTLEMEN: An examination of the properties acquired for the State by your Commission, in the performance of its statutory duty, together with a broad survey of the whole field of operation, physical and economic, fill me with great surprise at the enormous treasure of mineral waters, the vast possibilities of their utilization in the promotion of the health of the people, and the splendid opportunity of the State. Were the work here to be carried on by a philanthropist of great wealth it would be repellant to consider aught but the chance to do good, to relieve suffering and distress, and to place within the reach of the invalid the remedial agency which will restore and, in some instances, cure. But the economic, the productive side of the case cannot be ignored by the most casual observer. Without question the development of these springs and the provision of adequate facilities for their employment will result in a large revenue for the State, a large response to the action of the legislators, providing ample proof of their sagacity in the establishment of this reservation. Careful study of the history and statistics of foreign spas convinces me that no such potentially lucrative opportunity or proposition exists elsewhere, in this country or in Europe.

The mineral waters have been used in a desultory fashion, and certain springs have been renowned for a generation, and many people have been benefited by drinking them, in spite of the unscientific modes of their use. But their employment for bathing, by far the greater remedial agent, has been almost totally disregarded. The accommodations thus far available, meagre and in no sense modern, have been and are negligible; because the prime constituent of the waters, the carbonic acid gas, has been ignored or misunderstood and allowed to escape. With knowledge accessible and with ample available facilities for studying the foreign spas, it is impossible not to be astonished at the former lack of method here, in view of the well-known results of scientific baths.

The wise acts of the Legislature and the Governor that created and empowered your Commission should be applauded for laying so broad and adequate a foundation. No timid, gradual plan, operating under small appropriations, with tentative developments, to serve a few invalids, would ever have succeeded. The complete grasp, by sagacious men possessing sound business sense, of the fact that only single, governmental ownership of the whole field of operation could succeed in restoring the waters and re-establishing values, was a most fortunate circumstance for both the State and its people. Thus the way was paved for the intelligent acquirement by your Commission of not only springs and mineral rights, but also small parks surrounding springs here and there, and in addition one large and beautiful tract of two hundred and fifty acres, diversified and charming, with its groves and streams, its ravine and meadows. affording the necessary opportunities for recreation, diversion and exercise that are so essential to a successful health resort.

A very thoughtful study of the chemical combination of the constituents of the waters, as well as of their therapeutic action, is necessary in order properly to restrict their use for drinking, hitherto rather reckless and indiscriminate. In this study the results of the physicians and chemists at foreign spas are of much value. since they cover long periods, and were reached after repeated empirical use. It is also necessary to study the foreign methods of installation of apparatus, and their choice and use of materials for carbonic oxide waters, since we in this country have never fully realized the value of our mineral springs, and have never manufactured appropriate and adequate apparatus. We must remember that we are not making an experiment, or embarking upon a novel enterprise. We have before us the examples of scores of successful English and Continental mineral water resorts. We must begin at the point which our foreign competitors have reached to-day. We must not grope and creep along as they did years ago. We profit not only by their mistakes, but also by their successes, and by a mastery of the methods which led to these successes. The American mind has the reputation of being able to grasp another's ideas and improve upon them. A very interesting and attractive problem of discrimination, utilization and practical installation lies before us, with two thoughts uppermost in the mind: First, to open wide to the sick and suffering the door of opportunity for treatment; and secondly, to secure for the State as large a return as possible from its investment. The matter must be studied, therefore, from the viewpoints of the financier, the administrator, the engineer, the physician, and the invalid.

We start with the great advantage of possessing the only known mineral waters saturated with carbonic acid gas east of the Rocky Mountains. This most important constituent is found no nearer than Colorado Springs, 2,000 miles away.

It seems altogether probable that but twenty or twenty-five of the 160 springs and wells will be utilized, and that the rest must be sealed at once, to preserve the carbonic acid gas and to prevent loss of hydrostatic pressure. Of the springs to be used a brief statement of the medicinal qualities and medical application may be of interest, though previously communicated in part.

The mineral waters of Saratoga may for our purposes be classified as follows:

> *Saline-Laxative,* including Hathorn No. 1, Hathorn No. 2, Hathorn No. 3, Columbian, Flat Well No. 2, Ditch Well No. 2, Island, Shonts No. 3, Coesa, Peerless, Emperor and Adams.
>
> *Alkaline-Saline,* including Geyser, Pump Well No. 4, Minnonebe, New Shonts, Clark No. 1 and Clark No. 2.
>
> *Ferruginous* or *Chalybeate,* including Flat Well No. 2, Old Red, New Red and Magnetic. Others, including the Columbian, are also mildly chalybeate, and many of the waters fall into two of these classes.
>
> Of special value as table waters are the Geyser and Minnonebe. The Geyser is valuable as an antacid, resembling the French Vichy waters, and containing iron and lithia in medicinal quantities. The Minnonebe is one-half as strong in alkaline carbonates as the Grande Grille French Vichy, and is suitable to be drunk freely during meals.
>
> All the waters are supersaturated with carbonic acid gas as they issue from the respective springs. Prescribed as chosen for individual cases, they are variously indicated for use in gastro-intestinal disorders, gout, rheumatism, arthritis, anaemia and obesity. Some are admirably

adapted for use in certain kidney disorders and in neurasthenia, intestinal fermentation, skin diseases, the elimination of various poisons from the body and the removal of certain exudations due to disease.

Valuable as are many of our great number of springs for drinking in various diseases, far more interesting and important is the use of our highly carbonated nonthermic waters for bathing purposes. Disorders of the digestive tract, gout, rheumatism, arthritis, lumbago, sciatica and other forms of neuritis, anaemia, early arterio-sclerosis, alcoholism, drug addiction, exhaustion following wasting disease or surgical operation, insomnia and obesity are all benefited by the use of the effervescing baths. Separate and special mention must be made of the value of exactly graduated baths in water saturated with carbonic acid gas, at properly adjusted temperatures, in the treatment of weakness of the muscle of the heart and certain valvular disorders of that organ.

Excellent results may be reached in reduction of overstout people or the actually obese by hydrotherapeutic treatment combined with proper diet and exercise and out-of-door life.

The wealth of springs here, in number and abundance of output, is probably unequalled at any one locality in the world. The gas content is strikingly large and constant, and is a most valuable constituent. To it is due very largely the therapeutic effects from mineral water baths. It exerts a profoundly stimulating effect upon the skin and upon the sensory nerves, through these reaching not only the nerve centers, but also by radiation and reflex action the entire nervous system. Upon the heart and circulation these effervescing baths have a special action. The baths increase the capacity of the cutaneous vessels and obstruction is removed from the internal organs through the distribution of a quantity of blood, thus lessening the demands upon the cardiac muscle. The effervescing baths are very useful in restoring poise, removing nervousness and irritability and alleviating insomnia, as well as in building up tissue in the victims of nerve fag, or neurasthenia, sometimes called 'nervous prostration.'

All our springs are radio-active. The scientists attached to the Bureau of Mines, Washington, D. C., report that the radio-activity is "due in an unusual degree to dissolved radium salts," therefore containing a permanent agent which will produce active emanations indefinitely. How much of the curative effect of mineral water baths is due to radio-activity is not yet known, but it certainly plays an important part in cases of gout, rheumatism, and old joint disorders. Possibly the old-time faith of the people in mineral springs was due to the results of this agent then unknown.

The development of Saratoga as a modern bathing and drinking spa is highly important to the physicians of this State and to the medical profession at large. To provide here the facilities for treatment and to afford here the relief from disease which so many thousands go abroad to seek, are matters of deep interest to every American practitioner of medicine.

Preliminary circulars have been sent to over 7,300 physicians of various New York State medical societies, and interest is being aroused through the dissemination of the facts of the amazing therapeutic possibilities of Saratoga.

A State-wide advisory council of representative citizens, largely medical, has been formed and their suggestions will be helpful in the further development of the Reservation property and in the creation of a school of hydrotherapy and one of massage.

The Saratoga Springs Medical Society will confine its literary activity this winter and next spring to the study of the therapeutic value of the waters for bathing and drinking, and of the disorders of digestion and tissue change which are especially benefited by their use. This Society has taken action which will finally lead to proper judgment of the qualifications of physicians who will aspire to practise at the future health resort which Saratoga will become, in order that conscientious and satisfactory medical work may be accomplished.

It is immediately necessary to acquire additional properties now known to be absolutely essential to the proper development of the Reservation and to secure sites, which should be promptly chosen, in order that we may plan for the early construction of the bath house and drink hall. It is imperative to order immediately from Germany material for the retubing of wells, so that the installation of modern equipment may be completed in time for the coming spring season. It is interesting to note that, while the State of New York is planning for Saratoga, application is being made to the United States Government by the officials at Hot Springs, Ark., for $50,000 to be used solely for a comprehensive study of the physiological effect and therapeutic value of the waters there.

It is of great importance that the development here should not be hampered or delayed, while the suffering await relief and the large investment by the State lies unproductive.

Respectfully submitted,
ALBERT WARREN FERRIS,
Medical Expert.

APPENDIX

Agreements on Compensation for Properties Taken.

At the time of the last report, twenty-one agreements had been made and approved, totaling $158,960. Since then seven agreements have been made, the total compensation being $301,250. In addition the sum of $56,686.72 has been paid from the fund for property taken for interest, incidental expenses of acquisition, and legal services in connection therewith. A further sum of $47,627.67 has accrued (as of January 15, 1914) by reason of interest upon claims adjusted in the sum of $266,250 included above and not yet paid for and other incidental expenses, thus reducing the fund available for further interest and expenses and for payment of claims not yet adjusted, to $85,475.61, which is much below the fair value of such properties, without the accrued interest and expenses.

The seven agreements of the past year are:

1. Hathorn. Two properties, one in the village, with wooden building and the Hathorn No. 1 Spring; one at Geyser Park, with two flowing springs and a wooden bottling house. The State has already paid for a one-tenth interest in the former property. Agreed compensation, $225,000.

2. Favorite. Forty-seven hundredths acres of land, with three bores, in the village opposite Congress Spring Park. Agreed compensation, $16,000.

3. Clark. Ninety-four hundredths acres of land, with three wells, and a small abandoned gas plant, since removed; also, the mineral rights on 3.8 acres adjoining. Agreed compensation, $8,500.

4. Shouts. Twenty-five acres of land, with one well. Agreed compensation, $7,000.

5. Dingman. Eighty-nine hundredths acres of land, with dwelling and other buildings, adjoining the Champion and Victoria Spring properties. Agreed compensation, $1,750.

6. Village of Saratoga Springs. Land and mineral rights in Congress Park, including the Congress and Columbian Springs. Agreed compensation, paid, $35,000.

7. Village of Saratoga Springs. Land and mineral rights in the Canfield Park area and in the Congress Hall site. Agreed compensation, $5,000.

Claims have been filed by the owners of the following properties, taken by the State for the Reservation:

1. Lafayette. Thirteen and two-tenths acres of land, with one well plugged and two not flowing, besides an abandoned gas plant, now removed. Amount of claim, $49,700.

2. Victoria. One and one-tenth acres of land, with one well not flowing and wooden building, now removed. Amount of claim, $50,000.

3. Wiswall. Eleven acres of land, with no wells nor buildings. Amount of claim, $16,202.

4. Lohnas. Mineral rights on twenty-five and eleven hundredths acres of land with seven bores. Amount of claim, $200,000.

5. Lincoln Spring. Twenty-four and sixty-two hundredths acres of land, with twenty-five bores and the Lincoln Spring which is not flowing. On the property are a bottling plant, gas pumping outfit, machinery, and buildings. Amount of claim, $559,000.

6. Geyser. Twenty and twelve hundredths acres of land, with four wells, including the old Geyser Spring; also a large brick building. Amount of claim, $150,000.

7. Levengston. Mineral rights on plot of land in the village, on which are two bores, one being the Levengston Spring. Amount of claim, $125,000.

8. Patterson. Mineral rights on plot of land in the village, including the Patterson Spring. Amount of claim, $105,000.

PAYMENTS FROM SARATOGA SPRINGS RESERVATION FUND.

UNDER CHAPTER 394, LAWS OF 1911, AND CHAPTER 239, LAWS OF 1913.

APPROPRIATION, purchase of land	$950,000 00

FINANCIAL STATEMENT.

CHAPTER 394, LAWS OF 1911.

Acquisition of Property.

1913.				
Feb.	1.	Balance, per last report		$164,530 34
	28.	George H. & Jennie M. Bowers, for property taken	$1,100 00	
		George H. & Jennie M. Bowers, interest	117 83	
		C. S. & C. C. Lester, legal services	187 00	
				1,701 83
		Balance, March 1, 1913		$462,825 51

CHAPTER 239, LAWS OF 1913.

Re-appropriation of Balance.

March	11.	J. S. Mott & Son, maps and surveys	$38 61	
	14.	Maud B. Olsson, for property taken	1,600 00	
		Maud B. Olsson, interest	138 93	
		Alfred B. Jenkins, for property taken	1,500 00	
		Alfred B. Jenkins, interest	130 25	
	21.	C. S. & C. C. Lester, legal services	251 00	
April	9.	Champion Natural Carbonic Acid Gas Co., for property taken	20,000 00	
		Champion Natural Carbonic Acid Gas Co., interest	2,360 00	
	12.	C. S. & C. C. Lester, legal services	542 50	
June	5.	J. A. Bensel, State Engineer, surveys	149 02	
		J. F. Hennessy, County Clerk, fees	7 55	
July	9.	Village of Saratoga Springs, for property	35,000 00	
		C. S. & C. C. Lester, legal services	1,754 37	
				63,472 23
		Balance, January 1, 1914		$399,353 28

SUMMARY OF PAYMENTS MADE FROM FUND OF $950,000.

For Acquisition of Property.

Agreed value of land	$493,960 00	
Interest	32,089 83	
Services and expenses of counsel	14,618 64	
Engineering services and expenses	2,482 53	
Expenses of property appraisals	1,845 07	
Miscellaneous expenses	5,650 65	
Total expenditures to January 1, 1914		$550,646 72
Purchase of land, agreements for compensation	$266,250 00	
Interest, estimated to January 15, 1914	43,352 22	
Expenses incident to acquisition	4,275 45	
		313,877 67
		$864,524 39
Balance to cover unsettled claims, January 15, 1914		85,475 61
		$950,000 00

CHAPTER 547, LAWS OF 1912.

Secretary's Salary.

	Appropriation		$2,500 00
	Balance transferred from Chapter 811, Laws of 1911		41 68
1913.			
March 15.	I. G. Rouillard, services, February	$125 00	
April 14.	I. G. Rouillard, services, March	125 00	
May 22.	I. G. Rouillard, services, April	125 00	
June 26.	I. G. Rouillard, services, May	200 00	
July 22.	I. G. Rouillard, services, June	200 00	
Aug. 16.	I. G. Rouillard, services, July	200 00	
Sept. 17.	I. G. Rouillard, services, August	200 00	
Oct. 17.	I. G. Rouillard, services, September	200 00	
Nov. 22.	I. G. Rouillard, services, October	200 00	
Dec. 20.	I. G. Rouillard, services, November	200 00	
1914.			
Jan. 15.	I. G. Rouillard, services, December	200 00	
			1,975 00
	Balance January 15, 1914		$566 68

CHAPTER 5, LAWS OF 1913.

General Expenses.

1913.			
March 1.	Balance		$2,107 37
15.	Hartwell & Shackelford, insurance	$21 00	
	N. Y. Telephone Co., telephone and telegrams	8 28	

1913.			
March 15.	Payrolls, Geyser and High Rock parks	$136 00	
	Saratoga Coal Co., supplies	23 75	
	H. B. Settle, photographs	8 00	
	Stone & Morris, livery	3 00	
	W. P. Tarrant, supplies	2 29	
	Ten Eyck Hotel, charges	26 00	
	E. B. Davis, services and expenses, February	62 20	
	F. Edwards, services and expenses, February	201 86	
	C. K. Seipel, services and expenses, February	62 35	
April 14.	Brown & Cushing, insurance	12 50	
	N. Y. Telephone Co., telephone and telegrams	11 98	
	Payrolls, Geyser and High Rock parks	203 50	
	G. F. Peabody, advances, office expenses	43 47	
	I. G. Rouillard, travel	35 48	
	Saratoga Coal Co., supplies	7 25	
	H. B. Settle, photographs	12 00	
	Towne-Roblee Hardware Co., supplies.	23 45	
	Worden Hotel, charges	2 80	
	E. B. Davis, services and expenses, March	67 05	
	F. Edwards, services and expenses, March	202 14	
	C. K. Seipel, services and expenses, March	64 50	
May 22.	F. E. Brickner & Co., electrical supplies	11 70	
	B. Brunner, office supplies	51 09	
	L. McH. Howe, special services	37 50	
	N. Y. Telephone Co., telephone and telegrams	8 70	
	Payrolls, Geyser and High Rock parks.	268 75	
	G. F. Peabody, travel	48 50	
	I. G. Rouillard, travel	44 86	
	G. F. Shevlin Mfg. Co., labor	3 45	
	Stone & Morris, livery	6 00	
	E. B. Davis, services and expenses, April	67 05	
	F. Edwards, services and expenses, April	201 30	
	F. P. Langley, services and expenses, April	56 15	
			2,045 90
Balance, June 1, 1913			$61 47

CHAPTER 435, LAWS OF 1913.

General Expenses.

Appropriation	$60,000 00
Balance transferred from Chapter 5, Laws of 1913.	61 47
	$60,061 47

1913.			
June	7.	Payrolls, High Rock and Geyser parks.	$927 26
	23.	Payrolls, High Rock and Geyser parks.	1,543 63
	26.	G. W. Ainsworth, repairs, Coesa, Hathorn No. 2	109 03
		Argus Company, printing, supplies	8 20
		H. Crocker, carpentry, supplies	573 55
		Edson Manufacturing Co., sewer pump	54 00
		J. W. Emery, supplies	8 00
		Farmers' Hardware Co., supplies	119 77
		General Carbonic Co., supplies	16 33
		Hartwell & Shackelford, insurance	193 68
		W. A. Heaslip, wrecking building	50 00
		O. V. Howland, insurance	45 00
		Ingham, White & Co., insurance	96 00
		Lewis M. Jones Co., insurance	12 50
		C. S. & C. C. Lester, legal services	4,803 51
		J. D. McNulty, insurance	135 00
		N. Y. Telephone Co., telephone and telegrams	64 98
		Payrolls, High Rock and Geyser parks	1.127 90
		G. F. Peabody, advances, office expenses	141 14
		Stone & Morris, livery	29 00
		Sun Printing Co., reprints	17 00
		W. P. Tarrant, plumbing, supplies	29 54
		Van Voast & Leonard, insurance	37 50
		G. W. Winship, concrete bridge construction	648 93
		E. B. Davis, services and expenses, May	97 80
		F. Edwards, services and expenses, May	254 57
		F. P. Langley, services and expenses, May	57 05
July	9.	Payrolls, High Rock and Geyser parks	1,440 11
	22.	G. W. Ainsworth, carpentry, painting.	136 08
		Argus Company, printing stationery.	34 00
		H. J. Dennin, special services	42 50
		R. Barnett, trees and shrubs	53 60
		H. Crocker, carpentry, supplies	301 17
		Farmers' Hardware Co., supplies	37 89

1913.			
July.	22.	J. B. Lyon Co., printing	$2 51
		National Express Co., express	29 00
		N. Y. Telephone Co., telephone and telegrams	16 99
		G. F. Peabody, advances, office expenses	90 43
		T. C. Schallehn, blacksmithing	10 95
		H. B. Settle, photographs	11 50
		Stone & Morris, livery	59 00
		Sun Printing Co., 5,000 copies "The Saratoga Sun"	76 50
		W. P. Tarrant, plumbing, supplies	33 22
		R. H. Thompson, painting spring pavilions	1,373 30
		B. F. Tracy, traveling expenses	59 75
		Van Voast & Leonard, insurance	3 00
		G. W. Winship, concrete bridge construction	1,174 96
		E. B. Davis, services and expenses, June	91 55
		F. Edwards, services and expenses, June	253 45
		F. P. Langley, services and expenses, June	53 25
		Payrolls, High Rock and Geyser parks.	899 22
Aug.	6.	Payrolls, High Rock and Geyser parks.	1,121 03
	16.	Albany Multiple Letter Co., services, supplies	18 00
		B. F. Bloomfield, fencing	10 60
		Collins & Spencer, plumbing	26 62
		Harry Crocker, office addition, carpentry	474 43
		Farmers' Hardware Co., supplies	11 75
		J. W. Fitzpatrick, plumbing	6 99
		John McClair, repair dam	176 79
		N. Y. Telephone Co., telephone and telegrams	16 96
		G. F. Peabody, advances, office expenses	41 38
		G. F. Peabody, traveling expenses	26 85
		C. F. Rattigan, Warden, office furniture	47 00
		Reeves-Reagan Paint Co., signs	31 50
		George F. Shevlin Mfg. Co., pipe, labor	16 64
		John E. Stowe, move High Rock tufa mound	246 77
		W. P. Tarrant, plumbing, supplies	4 75
		R. H. Thompson, painting	96 00
		B. F. Tracy, traveling expenses	65 91
		Van Voast & Leonard, insurance	3 00

1913.			
Aug.	16.	E. B. Davis, services and expenses, July	$97 20
		F. P. Langley, services and expenses, July	57 20
		Saratoga Trap Rock Co., dynamite, exploders	15 00
		F. Edwards, services and expenses, July	251 70
Sept.	2.	Payrolls, High Rock and Geyser parks.	1,076 36
	12.	Payrolls, High Rock and Geyser parks.	1,011 49
	17.	Adirondack Electric Power Co., supplies	20 90
		Argus Company, printing supplies	56 00
		Arondack Spring Co., carbonic acid gas	7 00
		D. Bradley, Jr., teaming	90 00
		F. E. Brickner & Co., electrical supplies	22 97
		A. L. Churchill, receiver of taxes, taxes	83 53
		H. Crocker, High Rock pavilion, carpentry	1,175 75
		H. J. Dennin, special services	107 50
		D. Eddy & Sons, seed	40 77
		Farmers' Hardware Co., supplies	30 45
		A. W. Ferris, services and expenses.	70 00
		H. L. Finch, painting, improvement	174 08
		General Carbonic Co., supplies	25 00
		D. B. Ledlie & Son, mason work	175 17
		C. J. Lundgren, supplies	4 50
		N. Y. Telephone Co., telephone and telegrams	25 84
		J. Peterson, services and expenses	245 34
		C. F. Rattigan, Warden, furniture	51 85
		Ross-Ketchum Co., travel	25 55
		The Saratogian, 5,000 newspapers	82 50
		Sherin & Son, electrical work, supplies	218 19
		G. F. Shevlin Mfg. Co., pipe, labor	7 25
		Stone & Morris, livery and auto hire.	90 50
		G. W. Winship, concrete construction.	417 97
		E. B. Davis, services and expenses, August	93 15
		F. Edwards, services and expenses, August	252 10
		F. P. Langley, services and expenses, August	54 90
	26.	Payrolls, High Rock and Geyser parks.	1,114 73
Oct.	7.	Payrolls, High Rock and Geyser parks.	580 19
	17.	Adirondack Electric Power Co., supplies	35 86
		H. Ant, services and expenses, August, September	202 60

1913.

Oct.	17.	F. E. Brickner & Co., electrical supplies	$47 61
		L. A. Cook, services and expenses	269 97
		H. Crocker, carpentry	50 88
		Crown Cork & Seal Co., crown corks	21 07
		Farmers' Hardware Co., supplies	46 07
		August Giese & Son, 1 Berkefeld Filter	12 00
		J. F. Hennessy, County Clerk, fees	2 75
		N. Y. Telephone Co., telephone and telegrams	24 01
		G. F. Peabody, advances, office expenses	47 88
		J. Peterson, services and expenses	88 50
		M. C. Rosenfeld Co., supplies	9 50
		I. G. Rouillard, travel	19 09
		Saratoga Coal Co., cement, coal	8 75
		H. B. Settle, photographs	32 00
		Stone & Morris, livery	23 00
		W. P. Tarrant, plumbing, supplies	606 92
		Towne-Roblee Hardware Co., supplies	41 40
		W. I. Wilkins, painting	88 00
		G. W. Winship, concrete construction	25 08
		Yawman & Erbe Mfg. Co., fittings	7 25
		E. B. Davis, services and expenses, September	93 70
		F. Edwards, services and expenses, September	257 92
		F. P. Langley, services and expenses, September	54 55
	25.	Payroll, High Rock and Geyser parks	565 69
Nov.	11.	Payroll, High Rock and Geyser parks	660 71
	22.	Adirondack Electric Power Co., supplies	16 82
		Burleigh Lithographing Co., labels	89 25
		Leslie A. Cook, services and expenses	144 38
		H. Crocker, carpentry	34 00
		Crown Cork & Seal Co., crown corks	28 31
		Farmers' Hardware Co., supplies	35 60
		A. W. Ferris, expert services	1,375 00
		J. W. Fitzpatrick, plumbing	2 10
		Hartwell & Shackelford, insurance	244 49
		Hathorn & Co., permanent improvement	1,037 89
		Hathorn & Co., disbursements for free water service	3,282 89
		J. F. Hennessy, County Clerk, fees	2 50
		John J. Koons, partition cases	380 00
		C. J. Lundgren, supplies	5 25
		J. D. McNulty, insurance	223 60
		J. Mangelsdorf, seed bags	77 00

1913.

Nov.	22.	G. F. Peabody, advances, office expenses	$59 45
		G. F. Peabody, travel	26 52
		J. Peterson, services and expenses	73 22
		Reeves-Reagan Paint Co., signs	90 55
		Saratoga Ice Co., supplies	37 12
		Savard Bros., supplies	6 50
		G. F. Shevlin Mfg. Co., pipe, labor	4 25
		Stone & Morris, livery	21 55
		Sun Printing Co., reprints and supplies	32 79
		W. P. Tarrant, plumbing, supplies	1,752 66
		G. W. Winship, concrete construction	72 65
		Wittemann Bros., services and supplies	120 41
		F. Edwards, services and expenses, October	251 65
		E. B. Davis, services and expenses, October	96 95
		F. P. Langley, services and expenses, October	56 20
	25.	Payroll, High Rock and Geyser parks	621 57
	28.	Dr. Paul Haertl, expert services and expenses	1,516 17
Dec.	15.	Payroll, High Rock and Geyser parks	471 33
	19.	Payroll, High Rock and Geyser parks	644 51
	20.	Adirondack Electric Power Co., supplies	6 93
		G. W. Ainsworth, special services	10 00
		Argus Co., printing, supplies	149 38
		A. E. Barber, roofing slate, improvement	23 57
		Leslie Betts, well drilling	480 00
		B. Brunner, office supplies	83 42
		L. A. Cook, services	125 00
		H. Crocker, carpentry	87 57
		Edson Mfg. Co., hose	23 40
		F. Edwards, services and expenses, November	250 65
		Farmers' Hardware Co., supplies	3 70
		A. W. Ferris, expert services	916 67
		Goulds Mfg. Co., supplies	38 00
		J. McNeary & Sons, livery	10 50
		N. Y. Telephone Co., telephone and telegrams	39 70
		G. F. Peabody, advances, office expenses	120 93
		G. F. Peabody, travel	19 73
		J. Peterson, services and expenses	66 00
		Pfaudler Co., 4 glass-lined tanks, bottling plant	545 60

1913.				
Dec.	20.	Ross-Ketchum Co., livery	$26 25	
		I. G. Rouillard, travel	21 13	
		H. B. Settle, photographs	108 69	
		G. F. Shevlin Mfg. Co., improvement	3 00	
		Stone & Morris, livery	35 00	
		W. P. Tarrant, plumbing, supplies	474 43	
		R. H. Thompson, painting	11 63	
		Towne-Roblee Hardware Co., supplies	31 08	
		B. F. Tracy, travel	25 48	
		Underwood Typewriter Co., typewriter	83 03	
		Van Voast & Leonard, insurance	4 50	
		G. W. Winship, concrete septic tank	265 00	
Dec	22.	C. C. G. Anthony, travel to Europe, investigation of European Spas	900 00	
1914.				
Jan.	9.	Payrolls, High Rock and Geyser parks	410 30	
	15.	Dr. Simon Baruch, expenses, investigation of European Spas	1,458 00	
		Argus Company, printing, supplies	33 16	
		R. Barnett, trees	26 55	
		B. Brunner, cabinet safe	154 00	
		W. J. Case & Son, carpentry	63 70	
		H. Crocker, carpentry	294 82	
		E. C. Eaton, teaming	30 00	
		F. Edwards, services	250 00	
		A. W. Ferris, expert services	916 67	
		L. O. Hall, trees	7 15	
		D. B. Ledlie & Son, mason work	57 26	
		P. Leonard, services	6 50	
		J. McNeary & Son, livery	13 50	
		National Express Co., express	8 46	
		N. Y. Telephone Co., telephone and telegrams	22 20	
		J. Paul, trees	81 00	
		J. Peterson, services, expenses	10 50	
		Saratoga Coal Co., supplies	7 00	
		T. C. Schallehn, blacksmithing	47 66	
		H. B. Settle, photographs	20 32	
		G. F. Shevlin Mfg. Co., pipe, labor	10 70	
		Stone & Morris, livery	16 50	
		W. P. Tarrant, improvement, plumbing	868 88	
		Ten Eyck Hotel, charges	77 10	
		Underwood Typewriter Co., supplies	47 00	
		G. W. Winship, concrete construction	272 78	
		Worden Hotel, charges	85 45	$54,344 85
		Balance January 15, 1914		5,716 62
				$60,061 47

Receipts to January 15, 1914.

1913.			
April	1.	J. G. Foulkes, rent, April	$10 00
May	1.	Saratoga Wood Craftsmen, rent	187 50
	3.	Champion Natural Carbonic Gas Co., sale, buildings.	16 00
	5.	J. G. Foulkes, rent, May	10 00
June	2.	J. G. Foulkes, rent, June	10 00
	3.	E. C. Eaton, sale, building	39 20
	11.	Hinsdill Electric Co., sale, motor	175 00
	14.	Security Steel & Iron Co., sale, building	277 50
	14.	E. C. Eaton, sale, building	40 00
July	2.	Security Steel & Iron Co., sale of metal	400 00
	7.	E. C. Eaton, sale, building	37 29
	14.	J. G. Foulkes, rent, July	10 00
	29.	E. C. Eaton, sale, building	311 00
Aug.	1.	Saratoga Wood Craftsmen, rent	96 50
	4.	J. G. Foulkes, rent, August	10 00
	4.	H. H. Tedford, hay	6 00
	4.	Security Steel & Iron Co., balance, sale of metal	341 22
	14.	General Carbonic Co., sale, tank	10 00
Sept.	8.	J. G. Foulkes, rent, September	10 00
	30.	J. R. Face, sale, shed	6 00
Oct.	1.	Security Steel & Iron Co., sale, tank	5 00
	1.	J. G. Foulkes, rent, October	10 00
	1.	H. H. Tedford, rent, October	6 00
	10.	New Hampshire Fire Insurance Co., claim	205 76
	10.	Security Insurance Co., claim	205 76
	10.	Newark Fire Insurance Co., claim	142 39
	10.	Home Insurance Co., claim	142 39
Nov.	5.	Robson & Adee, commission	35 38
	5.	G. P. Christy, commission	40 09
	6.	H. H. Tedford, rent, November	6 00
	6.	J. G. Foulkes, rent, November	10 00
Dec.	19.	H. H. Tedford, rent, December	6 00
	19.	J. G. Foulkes, rent, December	10 00
1914.			
Jan.	12.	H. H. Tedford, rent, January	6 00
	12.	J. G. Foulkes, rent, January	10 00
			$2,843 98

Forwarded to Comptroller.

May 7, 1913	$223 50
July 2, 1913	941 70
August 6, 1913	812 01
September 9, 1913	20 00
October 7, 1913	27 00
October 10, 1913	696 30
November 8, 1913	91 47
January 15, 1914	32 00
	$2,843 98

REPORT OF PROFESSOR SIMON BARUCH, M. D., ON EUROPEAN SPAS.

New York City, *December* 23, 1913.

Commissioners of the State Reservation, Saratoga Springs, N. Y.:

Gentlemen: — Complying with your request to visit the most prominent health resorts in Europe, I inspected the following towns and springs:

Bath and Harrogate, in England.

Vichy in France.

Baden-Baden, Homburg, Wiesbaden, Kissingen, Nauheim, and Brückenau in Germany.

Karlsbad, Marienbad and Franzenbad, in Austria-Hungary.

My method of procedure was as follows:

1. The administrative and executive officers were interviewed.
2. Physicians of prominence were visited for information on methods of treatment, sources of visitors and diseases treated.
3. Buildings and parks and appurtenances were inspected.
4. Balneological and technical experts were sought out.
5. Patients whom I met at these resorts or returning from them, were interviewed.

Referring to notes contained in a bound volume, which is hereby placed at your disposal for details, I would offer the following summary:

Administration.

With regard to the general administrative methods of these resorts a natural reticence was encountered as to details. I found that all were the property of a city or state. The administration of the resort was always in the hands of competent men of business capacity. The city corporation or government appoint subcommittees of members of the Medical Societies, who thereby obtain a voice in their deliberations. In other resorts there is an *entente* between the medical men and the administration which always inures to the advantage of all parties concerned.

It would be wise to follow the example of these successful spas, in which no important step is taken without counsel of the Medical Society or its committee, especially as this advice is freely given without remuneration and solely for the prosperity of the health resort.

Saratoga Springs differs from all other health resorts in the United States in that it is owned by the State, like many of the European Springs, and for this reason the methods adopted by the purely commercial enterprises owned by individuals or companies may be avoided. If the good-will of the medical profession of the United States, upon which future prosperity depends, is to be won and retained, these evils must be guarded against with incessant watchfulness.

SOURCE OF PATIENTS.

Physicians at all the health resorts are agreed that over one-half of the visitors are referred to them by their family physicians. The local medical society bears the responsibility of the ethical conduct of its members and thus the interests of the home physician, and what is more important, of the patient, are in its hands indirectly. In most of the resorts no curative treatment of consequence is administered without a prescription from a physician.

REGIME.

All physicians are agreed that it is practically impossible to carry out a strict regime with patients residing in *table d'hote* hotels, with the exception of a small minority who are seriously in pursuit of health. For this reason, there have sprung up in every health resort sanatoria, in which a strict regime is ordered and enforced most rigorously. These will be referred to below.

PARKS.

Your sagacity in obtaining a large acreage of parks will be fully realized when these are laid out in paths, of varying grades, as is done in many European resorts. The importance of systematic exercise in the management of chronic maladies is an acknowledged fact.

SANATORIA.

In some of the resorts, e. g. Franzenbad, these sanatoria are known as villas. Some of these bear the doctor's name on the card or sign; in others, like Dr. Pariser's in Homburg, which is one of the best in Germany, they are known only by the street number, which is recorded as the residence of the guests (patients). A list of the latter is regularly printed and sent to all hotels and pensions (boarding houses). In Kissingen there were only two sanatoria when Dr. Dapper opened a small institution on borrowed capital. Now there are eighteen, or more, accommodating from 10 to 200 patients each, ranging in fees from those of an ordinary boarding house to those of the finest hotel, doubled and trebled. These sanatoria, conducted by capable physicians as a rule, enhance the reputation of the resort enormously. From interviews with patients, the treatment prescribed at most of these sanatoria indicates a reliance more on discipline than on the waters of the springs, highly as they may be valued. The doctors are veritable martinets and bid the patients depart when they violate the rules repeatedly. Several instances of this experience, one of an American multi-millionaire, another of a politician whose will was law at home, were brought to my notice.

The administrative authorities of Saratoga Springs may well take example on this point and always uphold the physicians' hands in matters of this kind, rather losing a recalcitrant patient than damage the reputation of the resort. Nauheim became a renowned resort by reason of its founder, Dr. Beneke, refusing cases not adapted for its methods. I had personal experience on this point several years ago. One of my patients, an obstinate man who disobeyed my advice to remain at home, was directed to return on the next day after his arrival in Nauheim, and died just before the ship reached port.

Bath Establishments.— Undoubtedly the most important fact noted during my sojourn at the great health resorts was the predominance of bathing establishments. You may remember that I directed the attention of the Saratoga Springs Medical Society to the fact that no resort depends upon its spring waters alone. Great as is this asset, and indispensable withal, the most renowned springs of Europe, even those whose bottled waters are sold all over the world, have added all the recognized therapeutic methods, and many have housed them in magnificent buildings, with attendants who are expert. Even in Vichy, the waters of which have long been renowned for drinking, the administration was induced in 1902, to construct a bath institution, which vies in magnificence with the best in the world. It covers 32,000 meters of ground, is 170 meters long and 165 meters wide, contains 136 bath compartments, thirteen douche rooms and other conveniences for water treatment. It also has a second class department containing 110 bath compartments, and a third class containing sixty-four compartments.

Marienbad is another example. In this resort I noted excellent accommodations for 300 simultaneous baths, of plain and carbonic acid waters. Only a year ago the administration added a new bath house of the most sumptuous construction, containing 173 tubs for various types of mineral baths. In the bound volume of my notes you will find descriptions with illustrations of the bath houses of every one of the resorts I visited, the most magnificent of which are the new baths at Wiesbaden and Nauheim, which are the last word in bath house designs.

I would emphasize the fact that buildings for the administration of baths, manual and machine massage, Zander, electricity, inhalations, and other approved modes of treatment *are urgently demanded in Saratoga Springs.* You have an abundant supply of carbonic acid gas and the waters contain this important therapeutic agent in large quantities, thus closely approximating Marienbad, one of the most frequented health resorts in the world. I shall offer some plans and ideas for improvement upon the methods pursued in the external applications of the water (Hydrotherapy) at that renowned resort, the adoption of which has already been approved for Marienbad by its able superintendent, who consulted me on the subject. Your commission would do well to ponder over the fact that the money expended thus far on the reservation will never furnish a financial return, nor other adequate return, unless

1. A bath house is constructed, that may be increased in capacity without diminishing its architectural beauty or the interior arrangements, for the administration of all forms of baths, douches and packs. *This is an immediate necessity.* My plan will produce a bath establishment superior in efficiency and economy to any instalment I have seen in Europe.

2. In my opinion, Saratoga Springs promises the greatest benefit in the treatment of diseases of tissue change, obesity, gout, rheu-

matism, diabetes and other ailments, not less distressing, like anaemia, neurasthenia, dyspepsia of various types. There is an absolute demand for the construction of a building I have long had in mind, and the plans of which were being prepared by architects conversant with this special work at the time I made the first address in Saratoga. In this arrangement the chief objections to the Turkish Bath in common use, the lack of privacy and the breathing of hot air, are obviated. This innovation is a feature not yet adopted generally because its physiological value in the oxidation of redundant fat has not been emphasized. But I have record of over 5,000 cases treated by this method and it is being adopted in all new instalments in this country. There is no doubt that this form of Turkish Bath would at once become popular and profitable financially.

3. Hydrotherapy, i. e., the systematic treatment by water administered by apparatus which I devised for this purpose twenty-five years ago and *which is not patented*, will be of immense value as a curative agent and will pay a large dividend on the investment. My reason for this statement lies in the fact that some of the most elegant pleasure and recreation resorts and hotels in this country have added this apparatus to their equipment. It may be found, for instance, in hotels at St. Augustine, Palm Beach, Hot Springs and Chase City, Va., The Plaza and Astor in New York, the Chamberlain at Fortress Monroe, and others, where it has done valuable service and added to the clientele enormously.

I advise the *immediate addition* of this apparatus on a small scale to the Magnetic Baths, to demonstrate how profitable it will prove when made part of the general scheme of bathing, and to familiarize the physicians of Saratoga with its methods.

AMUSEMENTS.

Details, in the bound volume of my notes, demonstrate that in all the resorts the most attentive consideration is given to amusements and diversions in parks, casinos, drives and scenic attractions. Music appears to be the chief amusement offered. In Bath and Harrogate, the best artists and orchestras are engaged for transient appearance. In the continental resorts, military bands predominate, being obtained from various regiments, noted for their excellent music. The morning concert, usually opening with a hymn, draws large crowds to the parks, where, as you may note in the illustrations of my notes, they sip their water, while promenading amid flowers and well-kept meadows and lawns, or under umbrageous and well-tended trees. The acreage wisely acquired by your Commission, will enable you to adopt this refining, calming and health-restoring practice to the fullest extent.

I note with satisfaction, too, that you are emulating in the reconstruction of Congress Spring Park, the artistic embellishments, so notable in the Continental spas. In my notes you may find many suggestions on this point. Morning and afternoon concerts are in vogue in England. The night concerts of the German spas draw immense crowds and furnish calming diversion before retiring. Ten o'clock is the limit of time. All lights in the casinos and public places are extinguished and all public rooms are closed. In Nauheim, the hotels extinguish their lights in the foyer, and other public rooms and gardens, at 10 P. M. Public gambling is abolished except in Vichy. It is fortunate that New York State has adopted this course here. Racing is still in vogue in Vichy, where it brings an enormous number of sporting people for six weeks, so that few health-seekers visit the resort during this period, from late in June to August 20.

In Baden-Baden, one week is devoted to racing and the sport is carefully guarded. I am glad to note that the gambling type of the racers, to which Saratoga has formerly owed its prosperity, has been abandoned, and that under wise laws racing has become a real diversion for health-seekers, instead of a thorn in their flesh. Physicians object to the temptations offered to health-seeking patients to indulge in games of chance and other vices that are the usual concomitants of the common gambling type of races. The former sad experience of Baden-Baden and of Saratoga Springs should exclude this type altogether, with the most watchful care.

DR. HAERTL.

I note with great satisfaction your energetic and wise action in following my counsel with regard to the engagement of Dr. Paul Haertl, the balneological expert, whom I discovered in Bad Kissingen. In my letters from that place, was written " The most profitable visit since my arrival in Europe I am now making in Kissingen, the conditions in which are almost identical with those of Saratoga Springs. The temperature and analysis of the waters are very similar to Hathorn No. 2. I found here the most energetic scientist practically conversant with all matters pertaining to mineral springs. He is the chief of all the work of pumping, concentration, conveyance and delivery of the waters, also of the Royal Laboratory. I send you a report on his work made at the request of the Bavarian government, by the highest authority in the world, Professor Fresenius. I have elicited a promise from him to come to Saratoga next October if the Commission desires his services." In a letter dated September 5th, I wrote " I desire to reiterate that his (Dr. Haertl's) engagement would be of the utmost value not alone in the development of all the sources in the springs, but as an asset in the exploitation of the springs among medical men." " It would seem quite in line with the aims of the Commission to crown my efforts of investigation by engaging him."

I also wrote, " Since my investigations here have confirmed my belief that the chief element lacking to make Saratoga a renowned health resort lies in the establishment of a fine bath house in which the carbonic acid supplemented by other modern procedures would be fully utilized, it will become necessary to insure a very large supply from your springs."

This expert has already visited Saratoga, pursuing his study of conditions there with marked skill and obvious good results. His investigations in the direction outlined in my letters written three months ago bear testimony to your alertness, enterprise and wisdom. To myself your confidence in my judgment is gratifying and my greatest satisfaction lies in the fact that you are already convinced of its correctness. I am confident that Dr. Haertl's counsel and demonstrations will be of incalculable benefit to Saratoga Springs and will furnish a key to the solution of many difficult problems. I advise your adoption of the suggestions contained in his report, with regard to the installations.

Sanatorium.

Another immediate need is the establishment of a sanatorium to be in charge of a physician, trained in the management of diseases of tissue change. * * * * * *

CONCLUSION.

I am ready to continue to aid you in the development of the State's property in behalf of suffering humanity, without regard to personal sacrifice, so convinced am I of the ultimate result if the State will display the same wisdom and enterprise that your Commission has manifested in all your actions.

The full report of my investigations is hereby transmitted in bound form for your guidance and the information of physicians who desire to consult its detailed observations.

Respectfully submitted,

S. BARUCH.

Professor of Hydrotherapy, College of Physicians and Surgeons, Columbia University, New York City.

REPORT OF PAUL HAERTL, PH. D., DIRECTOR OF THE CHEMICAL AND BALNEOLOGICAL LABORATORY AT BAD KISSINGEN, ON SARATOGA SPRINGS.

To the Honorable, the Commissioners of the State Reservation at Saratoga Springs, State of New York:

GENTLEMEN:— I beg leave to report that the visit to various European spas of the distinguished Professor Doctor Baruch of New York, made at the request of your Commission, brought him to Bad Kissingen to study the administrative and therapeutic resources of this renowned health resort. Dr. Baruch and his secretary, Dr. A. J. Whittson, were introduced to me by Dr. Hesse. I had the pleasure of showing them the Royal Chemical and Balneological Laboratory of which I am the Director. In response to Dr. Baruch's desire to inspect the installations for piping, conserving and delivering the various Kissingen spring waters, I had the pleasure of conducting him to the various springs at and near Kissingen and Brückenau. Dr. Baruch was so much impressed by our most modern arrangements that he expressed a desire to obtain my services on behalf of the Saratoga Reservation Commission. Being myself interested by the Doctor's enthusiasm for Saratoga Springs, which he regarded as being a great boon to suffering humanity if properly exploited, and also stimulated by a desire to come in personal contact with the people of your country and all the new and advanced methods which I am anxious to learn, wherever found, and wishing to increase my information on the subject of mineral springs, I unhesitatingly accepted his proposition to spend my vacation in Saratoga Springs. The delay in my arrival, which Dr. Baruch was insistent upon hastening, was due to the necessity of my obtaining permission from my Government. According to the request of Dr. Baruch, I brought all the implements, instruments and charts which could be used to enlighten your physicians and engineers and the personnel of the Commission. I regretted the delay, but I am glad that I arrived here in time to accomplish the work. My first object was to become acquainted with the members of the Commission and the various officials connected with it and with any documentary evidence as to the performance of each spring. Accompanied by Commissioner Peabody, Dr. Ferris and Engineer Edwards, I visited every spring on different occasions. Judge Lester was consulted very frequently and his knowledge of the history of the springs and their past and present capacity was of great value to me.

Aside from the information obtained concerning the presence of the springs, their history and their past performances, I was concerned to ascertain the effect of the pumping. I learned that in recent years the springs had been exploited for obtaining carbonic acid gas for commercial uses rather than for curative purposes. During this inquiry I learned that the springs had been greatly weakened by excessive pumping and that through these means the former level of the springs had been very decidedly lowered. This information proved of great significance to me in the determination of the true condition of the springs.

First. It became clear that the integrity of the springs had not been permanently injured since they had been rescued by the wise conservation adopted by the Commission. The natural condition of the springs has not yet been exactly reached, despite the fact that it has been slowly but surely approached. The delay in rehabilitating these springs is due to the fact that there were forty-four borings in one locality which emitted gas and in this way diminished quite appreciably the pressure of the gas within the whole area of the springs. The history of the High Rock Spring proves that it is sure that a much larger supply and a much higher pressure would be produced by proper management. The shape and size of the opening in the High Rock cone indicates that there was formerly a much larger and higher column of water flowing through it. Inasmuch as a few decades play no part in geological formation, it would indicate to the geologist that the former active condition and greater flow could be restored. In order to reach this confirmation it is necessary to close all the openings through which the gas and mineral water are escaping, excepting those which are absolutely necessary to the health resort. They must be hermetically sealed in such a way that they can be opened whenever necessary. All the springs which are to serve a curative purpose should be provided with an arrangement for closing them at any time in order to regulate their pressure and flow. The most important recommendation I would make in this connection is the immediate construction of pits which must be below the ground water level (and the deeper the better). By this means it is possible to draw the mineral water from a lower level because the hydrostatic pressure is used to greater advantage. The pit also enables one to reduce the diameter of the stream and in that way increase the height of the column in inverse proportion. Each spring must be provided with a manometer in order to ascertain the pressure at different times and under different conditions. Only by this very complete and methodical arrangement is it possible for one to ascertain, control and regulate each individual spring and also to obtain information upon the dependence of the springs upon each other, which can only be ascertained by measuring the force, volume and gas contained in the flow. Only by this precise method may those conditions be made constant in the chemical content of each spring which are essential for precise prescriptions of physicians. I have demonstrated that the quantity of mineral water will be decidedly increased by this arrangement of pits, etc., a circumstance which is of the greatest importance when the waters shall be utilized for baths.

The system of piping now in use is very primitive and it is remarkable that such good results have been achieved under such unfavorable conditions and at so small expense. The wrought-iron pipes now in use are absolutely forbidden by law in Germany for conducting mineral waters containing carbonic acid gas, because the gas causes a steady and permanent corrosion of the iron which not only injures the pipes but also produces a chemical decomposition which changes the character of the water and makes it injurious to health. There are also liberated gases which impart a positive odor to certain of the waters. Moreover the small diameter of the pipes is extremely unfavorable to the maintenance of the proper proportion of carbonic acid gas and water, because a narrow pipe favors an immense loss of carbonic acid gas which deprives the water of the necessary CO_2 content, through friction. The best material for pipes which conduct carbonic acid waters is phosphor-bronze. Pure electrolytic copper is the second best material. This is about 15c cheaper than the phosphor-bronze. Phosphor-bronze consists of 90 per cent. copper, 10 per cent. bronze and

2/10 per cent. phosphorous. These two materials are the only ones that can be depended upon to convey carbonic acid water without corrosion and it follows that the present piping should be replaced at once in order to remove the odor produced by the decompositions referred to above, which is a serious objection which might be raised by those who consume the drinking water. In order to render the waters acceptable for consumption by the people the substitution of phosphor-bronze or copper pipes must be accomplished at once. Another important point is the change of the diameter of the pipes to a size permitted by the present bores of the various springs and in consideration of their safety. This change of diameter will prevent the enormous loss of carbonic acid gas now incurred through friction and would increase the radioactivity by reducing the agitation of the water in the well which facilitates the escape of the radium emanations together with the carbonic acid gas. The available quantity of water is, according to my experience, decidedly increased according to the increase in the diameter of the pipe under the above conditions. In the springs which are to be abandoned the iron pipes and iron casings now in use must be withdrawn, and watertight wooden tubes substituted, the wooden tubes being placed so as to descend to a point somewhat below the ground water level, and each should be supplied with an arrangement for reducing the caliber and with a manometer containing an outlet for gas, according to the method demonstrated to Engineer Edwards.

Second. THE SUPPLY OF WATER. In view of the fact that over fifteen years of pumping has not exhausted these springs beyond restoration, I am confident that the more moderate usage of the water for therapeutic purposes can never exhaust the supply. The methods which I have suggested for conserving the gas, namely larger bores, pipes and the closing of unnecessary artesian and other openings, etc., offer an additional warrant for this view. These considerations justify the opinion which I do not hesitate to pronounce that future demands upon the springs which are certain to arise when Saratoga becomes the renowned health resort, which its mineral springs and environment promise, will be amply responded to by the natural supply of water and gas within its subterranean area. Many European health resorts are engaged in an effort to respond to the increased demand upon their water and gas supply which gives them great anxiety, and Saratoga is very fortunate in having so abundant a supply that only intelligent methods will be necessary to meet every demand; and for this reason I advise that the present outlay be ample to prevent future contingencies from demanding in the end a much greater outlay as is now frequently occurring in the cases of some of the European Springs.

Third. THE DISTRIBUTION OF THE MINERAL WATERS. I advise that the Commission in charge of the Reservation should so arrange the distribution of the spring waters for utilization that it should be the master of the situation and not be subjected to contingencies which are constantly arising in other health resorts demonstrating that the springs are the masters of the administration. The latter is often called upon to rearrange its methods of distribution, the conduits and points of delivery, etc., in accordance with changes manifesting themselves in the course and flow of the springs. In order to insure an advantageous result I advise a centralization at a common point of the conduits of such springs as are regarded as suitable and valuable for drinking purposes by your Medical Advisor. This does not exclude a delivery of the drinking waters to visitors at the points of emergence of the springs. The most obvious reasons for a central drinking hall are as follows:

1st. Some of the springs are at a great distance from the village.

2nd. A central drinking hall will be so constructed as to offer protection to the patients in inclement weather, even in winter.

3rd. Patients unable to undergo fatigue may easily walk or drive to a central drinking hall.

4th. Such a central hall will permit the use of the various combinations of different waters as prescribed by the physicians.

5th. Waters which must be administered hot when so prescribed, can only be supplied economically from a central arrangement.

6th. Many of the Saratoga waters are valuable for throat affections, in which they are prescribed by physicians. They are administered most effectively by inhalation or gargling in special rooms connected with a central drinking hall.

7th. The most useful practice of physicians is to prescribe that certain of the waters be taken before breakfast. Some of these waters have a purgative or a diuretic effect, which would render it inconvenient for many patients to use the waters at distant points.

8th. The music provided near the drinking hall, which is an essential element at the European Spas, attracts the patients and their friends and enables them to indulge in pleasant social intercourse or to promenade while drinking the waters prescribed.

9th. The centralization of the drinking facilities under one shelter would cost no more than the provision of a separate shelter for each drinking spring.

10th. The delivery of water to patients will be under better and more economical control.

11th. The centralization of the drinking waters also facilitates their delivery to the neighboring bath establishments.

Conduits for the centralization of the water delivery are best constructed of wood or tin-lined iron pipes. The diameter must be dependent upon the supply and demand of each water. It is understood that pumps are necessary for the delivery of water at distant points. The entire plan and arrangement of distant delivery is exemplified by the success of the Luitpold Quelle which was conducted under my direction two and three-quarter miles without loss of carbonic acid gas. (See report of Professor Fresenius, which I have handed you.) The necessary power for the pumping and other methods of delivery may be fortunately obtained here at a moderate expense, as I have been informed by competent persons. The visible pipes and other metallic installations in the drinking hall should be constructed of phosphor-bronze. All the methods and procedures above referred to and others which are necessary for conducting, pumping and heating the waters have been discussed with the officers of your Commission.

Fourth. GRADIERWORKS. These are structures used in many European mineral spring resorts for the purpose of concentrating by evaporation the therapeutically efficient mineral salts of the water, or to obtain soluble salts in the dry state for addition to baths or drinking water or for sale. Aside from the usefulness of the common practice of inhaling the air near these works, large profits arise from the sale of the salts and propaganda of the springs made thereby. A description of these works has been given to your engineer.

Fifth. Water Supply for Baths. On the subject of utilizing the waters for bathing, it is not necessary for me to dwell extensively, since at several American establishments hydrotherapy is practised. I would only add that in this country the natural carbonic acid gas baths have never been used at all as far as I know. This is a deplorable fact which I realize since my arrival here for the examination of the Saratoga Springs. From these examinations I am convinced that an enormous field presents itself here. It is a well known fact that the artificial carbonic acid baths, called Nauheim baths in this country, are far inferior to the baths in the natural carbonic acid gas water as delivered in the mineral springs of Kissingen, Marienbad, Nauheim, Homburg, etc. I am prepared to demonstrate this statement if called upon. In the United States, I am informed, artificial carbonic acid gas baths are used almost entirely for heart disease, in which their use by the skillful medical men of this country they are doubtless useful. In Kissingen with which I am most familiar, the carbonic acid baths have been used for several hundred years in nervous diseases, dyspepsia, convalescence from acute diseases, as a tonic and for reduction effect. Heart diseases are only an addition in recent years. The various methods prescribed by physicians are not within the scope of this report. I note with pleasure the reference to them in the extensive report made to your Commission by Dr. Baruch. In view of the fact that the waters of Saratoga are enormously rich in carbonic acid gas as I have demonstrated with my apparatus with exactness in every spring, and considering the enormous quantities of waters available, Saratoga Springs must become the Mecca of health-seekers for bathing as well as for drinking the waters.

Sixth. Radio-activity. All deep natural mineral springs derive much of their virtue aside from their mineral and other contents from radio-activity. This is a term which is used a great deal for advertising purposes but there are instruments for exactly measuring the radio-activity. The estimate made by the Bureau of Mines in Washington does not present the full radio-activity of the springs of Saratoga, because the samples were obtained under conditions unfavorable for an exact determination. I am convinced that many of the emanations of the waters now forcibly expelled from the borings are lost through this agitation of the water, and escape with the carbonic acid gas. The barytes contained in some of the Saratoga springs would indicate radio-activity of the imbibed waters during their passage through the alimentary canal. A precise determination of the emanations has not been possible during my stay here, although I had the instruments for that purpose, because of the conditions stated. When the improved conditions of delivery of the waters are made, the exact radio-activity will doubtless be determined and published.

Seventh. BATH HOUSES. The architect must understand the great difference between the mineral water baths and ordinary water baths. The installation is not entirely architectural. Consultation with the Medical Advisor is necessary. One point that I would especially emphasize is the method of warming the carbonic acid water has recently been very much improved. The installation at Brückenau which I had the honor to direct offers all advantages. I propose to send you an actual tub provided with the apparatus necessary which will preclude a description. Another point is that all the appurtenances of the bath house must be such as to resist the corrosive action of the mineral waters.

Eighth. LABORATORY. A well equipped laboratory is actually essential, where analyses may be made together with tests of radioactivity, examinations of materials, etc.

Ninth. EXPOSITION. I hope to learn that your Commission has prepared an exhibit for the Panama Exposition at San Francisco which will draw guests to Saratoga.

In 1909 I submitted, at the request of the Finance Minister, a budget of what was thought desirable for the Government to add for the construction of a thoroughly up-to-date bath house and on the submission of this budget asking for 6,000,000 marks. The Bavarian Landtag approved this sum, all of which has been expended under my direction for a drink-hall, for a promenade, for a bath house with completely new installations, and a kurhouse. In addition to this sum of 6,000,000 marks, the yearly profits from the kur tax that annually amount to 450,000 marks have been expended by the Government on improvements in making new roads and attractions for visitors. Apart from the 6,000,000 marks expended on new equipment and improvements, we are now in 1913 asking for 1,000,000 marks to build a new bath house in Kissingen. I beg also to state that Bad Nauheim five years ago expended 7,000,000 marks for new installation, equipment and improvements and only recently at Wiesbaden in Hesse-Nassau 4,000,000 marks have been expended for new bath equipment.

In conclusion, Saratoga is a bathing place without rivals of moment in the State, and has all other requirements, such as climate and environment, important for a *first-class health resort*. So I believe seriously that the State of New York and the men who represent it, who protect the great work and help many poor sick people who will feel very thankful to Saratoga, are erecting a *monumentum aere perennius*.

(Signed) DR. PAUL HAERTL,
Vorstand des Balneologischen Staatslaboratorium, Bad Kissingen.

REPORT OF PROF. CHARLES G. ANTHONY OF UNION UNIVERSITY, CONSULTING ENGINEER.

INTRODUCTORY LETTER.

SCHENECTADY, N. Y., *February* 28, 1914.

To the Saratoga Reservation Commission:

GENTLEMEN :— On the 24th of last December you ordered me to go abroad to investigate several European Spas. In compliance with such orders I visited Vichy, Brückenau, Wiesbaden, Nauheim, Saline, Kissingen, Harrogate, Bath, and Homburg, and present the attached report.

I spent seven days at Kissingen in the company of Dr. Paul Haertl, whose assistance proved most helpful, and the benefit I derived from this association cannot be over-estimated. I wish further to acknowledge the uniform courtesy extended to me by every one upon whom I had the pleasure of calling. I trust it is not out of place for me to state here that I fully appreciate the expression of your confidence in me, as shown by giving me this commission. I can only hope that you will not be disappointed in the result, and that I may be considered worthy of your continued confidence.

Very truly yours,

CHAS. G. ANTHONY.

PRELIMINARY STATEMENT.

I went directly to Bad Kissingen with letters to Dr. Paul Haertl, director of the government chemical and balneological laboratories there, who received me most cordially, and assisted me in every way possible to get full data, and gave me advantageous introductions to the managers of other spas. I was impressed by the high regard in which Dr. Haertl is held all over Europe, and my own observation as I went through the establishment at Bad Kissingen, taking measurements, making drawings and notations in detail of the installation there, fully confirmed the estimate of his exceptional knowledge and rare judgment respecting mineral water springs. I visited Bad Kissingen, Brückenau, Vichy, Wiesbaden, Nauheim, Saline, Harrogate, and Bath.

Personally I was astonished to discover how vast this commercial enterprise of mineral spring development has become, with most extensive baths and other uses being made of the waters. I find that legends of the utilization of mineral waters date as far back as 800 B. C., and at Bath, England, one of the most famous of the European spas, legend attributes their discovery to Prince Bladud, son of the ancient British King Lud Hudibras, the father of Shakespeare's immortal King Lear. The story is recorded as actual history by some old writers, and relates how Bladud, being afflicted with leprosy, was driven from the Court, and in great distress wandered into Somerset, where he obtained charge of a herd of swine. The swine contracted this loathsome disease, but, chancing upon some hot springs boiling up from the earth, in search of relief, they wallowed day after day in the steaming morass, with the result that the leprosy left them.

Bladud, observing this remarkable condition, followed their example, and was himself cured of the disease. He then returned to the Court, and eventually succeeded to the throne. Thereafter he visited the scene of his wonderful cure, enclosed the springs, built palaces and temples, and thus founded as his capital "The City of the Hot Spring."

The mineral springs of England and Germany were used by the Romans as early as the first century, and for nearly 400 years some of the present famous bathing resorts were ancient Roman spas. It is even now possible to use some of the old Roman baths just as they were constructed hundreds of years ago.

It has been the thought of some doctors that the value of the mineral spring treatment was due less to the curative powers of the mineral waters than to the change of air, and the release from home, professional, and social duties, which were to be secured by a visit to a health resort. The real reason for the wonderful cures was not, however, fully known until the relations between physics and chemistry were discovered, and the fundamental principles of physical chemistry were established and this science became a recognized fact. The application of inorganic salts for the upbuilding of an organism has now become a science, and the cures obtained by a judicial use of mineral waters are almost beyond belief. Sir William Ramsay helped to solve this riddle and explain the cause of the therapeutic action of mineral waters when he discovered helium. He proved that the presence of helium in mineral water is an indication that radium has been concerned in its production. Of course the healing power of radium is now well known and established.

The amount of money which has been expended in providing for the proper use of these waters abroad is greatly beyond my previous knowledge or conception. I should think that $100,000,000 was a small estimate of the total amount invested, and without direct information I should also estimate that the net returns would cover good interest on this sum. One bath house alone at Wiesbaden would, in my opinion, cost nearly $1,000,000 to duplicate in this country. As has been stated, at Bad Kissingen there has recently been expended $1,500,000 for enlargements and improvements, and it is proposed to expend a large additional sum this year.

It is a striking fact that the larger number of the important foreign spas are comparatively within a few hours' ride of each other, so that there is the closest competition. I was especially impressed with this situation in contrast with the conditions in the United States. I found a deep interest already aroused in the movement which the State of New York has at last made to conserve the great natural wealth of the mineral springs of Saratoga, which has by far the greatest reputation in Europe of any resort in this country. Every line of study which I made confirmed my opinion that this is one of the most important and most wise of the later movements of the State of New York in the interest of conservation. I am only astonished that it has been so long delayed, for it is manifest that only the power and resources of the State of New York, with the constitutional limitations as to local indebtedness, could have dealt rightly with this problem of the protection and development of Saratoga's invaluable mineral waters.

While Saratoga has the facilities for developing a bathing resort, it has at present nothing like the European spas. We found places with two, three, or even five springs, where it was necessary to conserve every drop of water to get the gas and to supply the bath houses and drinking halls, to which thousands of Americans are flocking every year. Saratoga has mineral springs of every description, with an unlimited supply of water, yet the State of New York has done nothing to develop the resort that can be compared with the famous baths of Europe. It seems to me the sacred duty of the State of New York to exploit the Saratoga mineral waters for the upbuilding of the health of the citizens of the State of New York and of the United States. New York has taken the lead in the conservation of natural resources. It has established new game laws, stocked its streams, reforested its mountains, and constructed dams and reservoirs to conserve its waters and its water powers, yet for years the mineral waters of Saratoga have been allowed to flow to waste and no attempt has been made to exploit and develop them.

Saratoga should indeed be as famous as any spa in Europe. It is a very extraordinary thing that, where in Europe there are so many springs having carbonic acid gas, there should be in this country no known springs charged with carbonic acid gas east of the Rocky Mountains, except those at Saratoga Springs. In Europe even the small bathing resorts, in the face of competition all over the continent and with a limited quantity of water and perhaps with only one character of water, are making many thousands of dollars every year from an extensive patronage by Americans. Saratoga has an unlimited supply of all kinds of mineral water, with no competition, and it should attract 250,000 persons every season.

To develop Saratoga properly will require a large amount of money, to be expended as the business shall increase, but it cannot fail to be an investment that will pay very handsomely if made sufficiently liberal to begin with, in order that the constructive development may be along broad and substantial lines. In the long experience of the European spas special apparatus has been invented, which should be installed at Saratoga Springs to develop and utilize most effectively all of these waters, including proper distributing pipes and adequate reservoirs. It will be necessary to have large and elegant drink halls, as well as extensive and luxurious bath houses, in order to compete with the resorts of Europe.

I was much impressed with the important relations of the park system to the success of the mineral water spas abroad. I was glad to think that the State Reservation Commission had realized this in advance, and had required the Village of Saratoga Springs to provide its uniquely beautiful park in the heart of the city, and has included within the Reservation the small High Rock Park, the Lincoln Park, and the Geyser Park of 250 acres, with its exceptional natural advantages of scenery and varied forestation. The Commission has acted most wisely also in arranging for the proper connection of these several park areas by the Pine Promenade under construction, and I shall do what I can to impress upon them further the necessity of adding to and extending the park system, with connecting boulevards as far as possible. It cannot be too emphatically stated that the park development is a very important factor in the utilization of these mineral springs, not only because of the direct money return but also because of the greater return in the benefit and restoration of health to the large number of patrons who will surely come if the conveniences are ample and attractive.

Unfortunately, it will take considerable time to secure from the manufacturers the material that is needed to retube and equip the present springs. I shall, therefore, urge upon the Commission that they place their orders with the manufacturers without any delay whatever, as it will be difficult at best to have the installations completed by June, when I understand the season is well under way.

ABBREVIATION OF REPORT PRESENTED BY PROFESSOR ANTHONY IN MARCH, 1914.

BAD KISSINGEN.

Bad Kissingen is located in the valley of the River Saale, at the foot of the Rhone Mountains, at an elevation of 605 feet above sea level. Kissingen is in the kingdom of Bavaria, twenty-one hours from Paris, or four hours from Frankfort-on-Main. The climate is about the same as that of Homburg, Nauheim and Saratoga.

Grounds and Buildings.

The bathing establishment is situated in the heart of the city, on the banks of the Saale. The plant consists of the Kurpark (an excellent piece of landscape architecture), the Prince Regent Luitpold Bath House, Royal Kurhouse Bad, the Drink Hall, the Maxbrunner Temple, Kurhaus and Conversationsaal.

No attempt will be made here to describe the grounds and buildings, as the plans attached, and others on file with the Commission speak more plainly than words. The attached plans Nos. 1 and 2 give a very comprehensive idea of the mineral springs and the topography about the springs and the bathing establishment.

In the very heart of the city, in the Kurgarten, are located three mineral springs: the Rakoczy, Maxbrunner and Pandur. The Rakoczy is world-famed, and is used for drinking purposes to a greater extent than the Pandur or Maxbrunnen. These three springs are not used for bathing.

One kilometer to the north of Kissingen is the Round Well, or Saline Fountain, and three kilometers distant from the town are the Schönborn and the New Spring.

The boring of the New Spring was begun in 1906 at the instance of the Royal Bavarian Government, and in May, 1912, it was completed, with all the plants pertaining to it. At these borings it was necessary to penetrate to primitive rock, through broken and erratic layers of stone. The vast quantities of gaseous carbonic acid are rising from the magnesian limestone layers. Issuing from the superincumbent new red sandstone, at a depth of 102, 145 and 185 meters respectively, three rich mineral springs are running towards the bore-hole.

The New Spring is pressed by means of very expensive and elaborately constructed pump and turbine plants, in such a manner into the ramified conduit system that its very high contents of carbonic acid are maintained to the very extremity of the water conduits, which extend to a great length. * * * * * *

With respect to the cure in the shape of a bath, it must be remarked that these baths contain a vast quantity of clear carbonic acid which settles on the skin of the bather in equally distributed gas bubbles. The formation of these gas bubbles continues uninterruptedly during the bath. Even if the bather moves his body, no perceptible diminution is to be noticed at the end of a prolonged bath. Measures have been taken to prevent the too abundant formation of carbonic acid on the surface of the water, lest disagreeable symptoms might accrue. On the whole it must be stated that these mineral spring baths are not to be indulged in indiscriminately, but ought only to be resorted to on medical prescription. * * * * * *

MECHANICAL EQUIPMENT AND THEORY OF MINERAL WATER PUMPING.

As stated before, the waters from Round Well, the Schonborn Spring and the New Spring are pumped long distances for bathing purposes, without loss of gas. The waters of the Rakoczy, Maxbrunnen and Pandur are heated and served as a drink cure without chemical change taking place. It took years of experimenting to accomplish this and many interesting facts have been discovered. The approved methods of accomplishing the results, the theory of the wells, and mineral water pumping, also the mechanical devices used are described in the following:

Why Wells Flow.

(1) When the stratum of earth containing the water is on an incline and is overlaid by an impervious substance, such as clay or slate, and the water-bearing stratum is pierced by a well at one of

its lower points, the water will flow. The water-bearing stratum may extend for many miles back from the well to a point where the tough, impervious stratum ceases, and there be filled with water. Wells of this character are numerous in Colorado, South Dakota, Iowa, Texas and Ohio, Indiana, Michigan and New Mexico.

(2) Water may be caused to flow by the presence of natural gas located under the water-bearing strata and bottled up in anticlinal cavities in the rock under great pressure. Such cavities in the rock have been found containing gas under a pressure of 1,000 pounds to the square inch. When a wall is drilled and pierces one of these pockets, the pressure of the gas forces any water in the well to flow.

(3) At many places along the coast, where there is an unlimited quantity of sand extending to great depths, flowing wells are obtained as follows: If a tube be driven down to where the water has been practically freed from salt by sand filtration; the filtered water, being freed from salt, has a less specific gravity than the water nearer the surface. The presence, also, of sulfuretted hydrogen in such gas tends to make it lighter. When the pipe has been driven to a sufficient depth, ranging from 300 to 600 feet, and once cleared of salt water, the well flows. The water from the bottom of such a well, if taken out and weighed, will be found to have a much smaller specific gravity than the water taken from the strata through which the well was sunk, and the water in the well will rise to a height above water level in that vicinity proportional to the difference in specific gravity between the water in the bottom of the well and at other points above. Also, the chemical action generates heat which the water absorbs. It is from this cause that flowing water is found at St. Augustine and Jacksonville, Fla., and Beach Haven and Brunswick, Ga.

(4) The presence of gas, such as carbonic acid gas or sulfuretted hydrogen gas, in the water, which when set free expands, causes the water to flow out. The same principle is illustrated in a bottle of beer or soda water, the liquid flowing from the mouth of the bottle when the cork is removed. In a great many cases, wells of this character will not flow unless the water is agitated.

A study of the reasons for the flowing of water from wells is listed above, and an understanding of the conditions as they exist at Saratoga leads to the theory that the wells at Saratoga flow as a result of the combination of (3) and (4). The difference of the specific gravity of the two heads of water is not due to the difference between salt and filtered water, but to the difference between fresh water and water highly charged with gas. It is evident that (4) also enters into the reason for the flow, because the flow may be regulated by the use of a pit, which may be described as follows:

In all German spas, where the flow of water is due to the CO_2 content, a concrete pit is constructed at the opening of the well, as follows: The concrete is cast in rings, the size and depth of the rings depending on the depth of the proposed pit. The pit is sunk by removing the earth from the inside of the ring, allowing the ring to settle as the pit is deepened. When the top of the first ring reaches the ground level, another ring is mounted upon the first and the digging renewed. The process is continued until the desired depth is reached. The concrete must be waterproofed, and care taken that all joints are watertight. The depth of the pit is optional, the only requirement being that the bottom of the pit should be below ground water level. The deeper the better is a general way of specifying the depth of the pit. Drawings herewith show the successive stages of the pit construction. The pit should be provided with a concrete bottom and an opening in the side for an overflow into the sewer. The overflow should be placed at minimum ground water level, and another a short distance below; the outlet pipes being provided with valves so that the depth of water in the pit may be regulated when the pumps (described later) are not in operation as in the winter season.

One of the remarkable properties of water is that it has the capacity to transmit a pressure applied at one point on the surface, in all directions and with equal intensity. The effect of the applied pressure is to cause an equal force per square inch upon all points of the enclosing surface. This property must be understood to grasp the theory of the pit construction at the outlet of each mineral spring; hence the following details may not be amiss.

Pascal was the first to discover this property of liquids, in 1646, and proved that the total pressure increased proportionally with the area of the surface. Taking a closed barrel filled with water he inserted a small vertical tube of considerable length tightly into it. On filling the tube the barrel burst under the great pressure thus produced on its sides.

One other law is involved in the theory of pit construction. namely Mariotte's or Boyle's Law. If a mass of gas become compressed, or be allowed to expand isothermally, i. e., without change of temperature, the tensions are inversely proportional to the volumes; or, in other words, the product of volume by tension is a constant quantity. This law, which is followed by perfect gases, was discovered by Boyle in England and Marriotte in France at about the same time, over 200 years ago.

With these two laws before us we will now take up the control of mineral wells by means of the pit. The earth may be considered as saturated with water, within certain limits. Water is found in solution channels, vaults, joints between planes, fractures of all kinds, and in the pores between the particles that go to make up the soil or rock. These pores are everywhere present and afford reservoirs for the storage of water. The upper surface is called the ground water level, and is, as a rule, a short distance below the surface of the earth, the depth depending upon the character of the soil, the amount of precipitation and the topographic conditions in the surrounding country. The zone of saturation extends from the ground water to an indefinite depth, the limit to which water will penetrate depending upon the pores of the rock. Whenever the superimposed rock becomes so heavy that pores cannot exist, the limit of saturation is reached.

Suppose now that a pit is constructed below ground water level, and a bore extends downward through the freshwater zone to the zone of the mineral water saturated with gas. The put and well must be so constructed that all fresh water is sealed out. Mineral water entering the bottom of the well contains a certain amount of CO_2 gas, the gas being under a pressure represented by the head H. As the gas moves up in the well, it expands and a cubic foot of gas at A becomes say two cubic feet at B, three cubic feet at C, and so on up the well. The water must of necessity have a less specific gravity in the well than the water represented outside the bore by the head H. Because of the large quantity of contained gas also, the specific gravity at I is less than the specific gravity at A, because of Boyle's Law. It is obvious then that the water in the pit will rise above the ground water level, due to the head H. When the water in the pit rises to a point where the downward pressure F equals the upward pressure F^1, the well will cease to flow. F^1 is not only the hydrostatic pressure, but also the gas pressure, and the only pressure that may be taken as radiating out in all directions at the mouth of the pit, and hence counteracted by F, is that part of the total pressure due to the gas, for the hydrostatic pressure is distributed by the water with equal intensity in all directions, as proved by Boyle's Law.

This is proved very conclusively by placing a pipe over the mouth of the well, in such a manner that the pressure F^1 is excluded from the well; when the water will at once rise to a much greater height. This added height is due to the gas pressure alone, because the gas that diffused through the pit is now confined to a smaller area, and in trying to escape exerts an upward pressure that forces the water to a higher level. As the diameter of the pipe is decreased, the water will rise higher and higher.

Leading from the bottom of the pit to the rock, a wooden pipe is placed, the pipe being provided with a copper or phosphor-bronze casting so arranged that the copper or phosphor-bronze tubing may be hung to same and extend downward to the bottom of the well. At the points where the mineral water is the strongest the tube is perforated as indicated in the drawing, to give the water free and unrestricted entrance to the well. The conditions are such at Saratoga that seals must be used above and below these perforations to prevent the large quantities of fresh water from entering the tube.

The water is taken from the pit to the storage reservoir by means of an especially constructed pump, the pump being designed with the following points in view:

(1) The friction between the pump and the water must be reduced to a minimum.

(2) The pump must not revolve more than from seven to ten revolutions per minute, in order that the water may not be unduly agitated.

(3) The pump must be constructed of such material as will withstand the action of mineral water (copper or phosphor-bronze).

(4) The pump must be provided with gas chambers so that the water will always be under a pressure of from twenty-eight to forty-two pounds per square inch, depending upon the character of the water. (The greater the salt content and the less the gas content, the greater the pressure required. The less the salt content and the greater the gas content, the less the pressure required.) Appended is a sketch of the pump arrangement at all the Bad Kissingen wells. From this sketch and from data taken at Kissingen the appended working drawing of a proposed pump for Saratoga has been designed. The sketch of a rearrangement of a Dean pump is omitted.

The reservoirs are constructed of reinforced concrete and as a rule are located in the side of a hill and completely covered with earth. They must be kept as cool as possible, for the cooler the water, the greater the CO_2 content. A regulating valve is placed in each reservoir to regulate the gas pressure. At the end of the line of pipe and near the bath house and drinking hall is placed an overhead regulating expansion tank.

According to the German physicians, people of any age are in most cases suited to the drinking treatment of the Kissinger waters. The Rakoczy, Pandur and Maxbrunner springs, located in the Kurpark are used for the " drink cure."

RAKOCZY WATER.

The Rakoczy water is the most popular of all the Kissingen springs, and an elaborate system of piping (all phosphor-bronze) has been provided to carry the water from the spring, heat it and serve it; and it is so arranged that the patient can help himself to the desired amount of water, either hot or cold.

The water flows from the spring direct to an electric driven pump. In fact there are two of these pumps, so that if one breaks down the system may be operated with the other pump. As a rule all the systems are constructed in duplicate. The pump forces the water to an overhead tank at the same time that the pipes are filled, the tank acting as an expansion tank and calculated to hold a constant pressure on the system. The drinking pipes are arranged in a rectangle, the Rakoczy spring being located in the rectangle at a lower elevation than that of the drinking system. Drawings explain the general scheme, and the detail of heating device.

PANDUR WATER.

The Pandur water is drawn from faucets located in different parts of the drink hall, the faucets being located as a rule about 3 feet five inches from the floor, against the wall. The water is drawn from the faucet by the patients into a heavy glass tumbler, all Pandur waters being drawn cold. To secure warm water, the tumblers being placed in a water warmer provided for the purpose. See drawing for details of the warmer. The idea of these devices is to heat the water only at the moment of drinking, as a few minutes after heating the water it becomes cloudy, due to chemical changes taking place after the change of temperature. This is also true for bathing waters, especially those containing CO_2, as the gas is liberated when the water becomes warm.

MAXBRUNNER WATER.

The Maxbrunner spring is located in the Maxbrunner Temple, a small stone building of elegant design, erected on the site of the spring. The Temple is really a drink hall, and is designed to supply the waters to patients who desire the Maxbrunner waters for a drinking cure. See drawing for details of the system. All machinery is located in the basement of the building. The water flows by gravity to the pump, and is then forced into a " recipient " reservoir. This reservoir serves also as a storage tank to retain the gas and produce enough gas pressure to force the water to the floor above. (This is exactly the same system as the one I designed for the Magnetic Baths of Saratoga Springs. Please compare.) As the water is pumped into the reservoir, gas collects at the top, and is gradually compressed as the quantity of water increases. Pumping is continued until a pressure of forty-two pounds per square inch in the pipe is obtained. (We must determine what pressure must be used on the Saratoga waters, by careful experiment.) The reservoir is constructed of wrought iron, and is water-proofed with a distillate of coal tar (A patent product obtained only in Germany. I am sure we can duplicate it here, as it looked to me like "Anthracene", one of the very heavy coal-tar distillates).

GRADIER-HAUS.

There is at the Saline spring, just facing the bathing establishment, a large and somewhat striking building, the so-called "Gradier-haus", where the Saale waters, forced to a great height by a pumping engine, runs uninterruptedly down over a dense layer of brushwood. This somewhat complicated method serves for the condensation of Saale, which loses by its exposure to the air the CO_2, while a certain amount of fixed ingredients, such as chalk and iron, are deposited on the brushwood. In this way a concentrated essence of Saale is obtained (up to 20%), from which by further methods mother-lye and the Kissingen Salt are obtained. The air at the Gradier-haus is charged with a fine shower of salt and contains, according to the analysis of Linder, more ozone than the sea air. The immediate surroundings are thus kept cool and pleasant, even on the hottest days, and patients can walk along the building or rest in easy chairs upon a well-sheltered veranda, and inhale this pure and bracing saline air. The building is constructed in the shape of an inverted T, the structure being wholly of timber and brush. Should a building of this kind be constructed at Saratoga, the framework would be made of concrete, and spruce tops used for the brush work. The timber at the Kissingen plant is now badly decayed, and has a rather dilipidated appearance.

BAD HOMBURG.

LOCATION AND HYGIENIC CONDITIONS.

The city of Homburg, commonly called "Homburg vor der Hohe," is located at the southeast foot of the Taunus Mountains at an elevation of 660 feet above sea level. Homburg may be reached by train in about thirty minutes from Frankfort-on-Main The city possesses a dry climate with a mild, pure air, the mean temperature from May to September being 18.6° C.

CENTIGRADE TEMPERATURES OF THE SUMMER.

	May.	June.	July.	August.	September.
Minimum	7.0	12.8	13.0	12.8	7.5
Maximum . . .	18.0	23.2	22.5	22.6	16.6
Mean	13.5	19.0	18.7	19.2	13.5

GROUNDS AND BUILDINGS.

Between the city of Homburg and the foothills of the Taunus Mountains extends an open plot of ground of 125 acres, containing within its boundaries ten mineral springs. Around this plot of ground, called the Kurpark, the bathing establishment for which Homburg is noted is located. The entire plant consists of the Kurhaus, Kurhaus Bad, Palman Haus, Wandel Halle and Kaiser Wilhelm's Bad. The Kurhaus and Kurhaus Bad are located on Louisen Strasse, in the main part of the city. They are connected by a heated gallery called Wandel Halle. Although these two buildings are in the main part of the city, especial pains have been taken to have them closely connected with the rest of the bathing establishment. This is accomplished by means of a boulevard extending from the buildings to the Kurpark, and a glance at the map will show that the entire establishment may easily be considered as a unit. This is a necessity, and all development at Saratoga must be made along this line. * * * * * *

The springs, ten in number, are located in the northeast part of the Kurpark and no doubt owe their origin to the same source of supply as those at Nauheim and Weisbaden. They are all cold springs. * * * * * *

MECHANICAL EQUIPMENT AND METHOD OF HANDLING THE WATER.

The plan used at Homburg for collecting and storing the water may be described as follows: The waters are collected at each spring and used for bathing in a pit constructed of stone and concrete, as described under Bad Kissingen. The water flows from these pits by gravity to a combination pump house and storage reservoir. It is then pumped from the reservoir to an elevated tank located on the roof of the bath house and led from this elevated tank to the bath tubs by gravity. The combination pump house and storage reservoir (called regulating shaft) is constructed below the ground level, the pump room being located above the reservoir. The pump room is covered by a glass top light and is reached from the ground level by means of a staircase. The water flows direct from the pit to the pump, where it is forced into the underground reservoir, or may be pumped direct to the bath house as desired. It is necessary to pump the water into the underground reservoir as a gas pressure of forty-two pounds per square inch is maintained in the reservoir at all times, and of course the water would not flow by gravity alone against this pressure. The water enters the pump house by means of copper or tin-lined pipe. All the waters from the different springs are mixed in the collecting shaft, or may be pumped from each spring direct to the bath. This shaft, or combination pump house and reservoir has an inside diameter of about 19¾ feet and a depth of 14 meters (46 feet). Electric power is used entirely, and the pumps are in duplicate, as are all pipes from the springs to the central supply, and from the shaft to the bath house.

The Germans at Homburg consider the regulating shaft unique, but I believe the expense of construction could have been reduced by half if the pump house had been constructed above ground and the reservoir made longer and wider and not so deep. To me it represents very poor engineering. The general plan is to be commended.

The water flowing from the elevated tank reaches the bath tub by means of gravity, where it is heated in the tub to the desired temperature. The heating is accomplished by means of steam coils placed between the two layers of a double bottom in the tub. The bottom of the tub is copper, with a few perforations to allow the water to reach the steam coils. The plumbing is all exposed. This is rather easily accomplished in a bath house where the tubs are all on the first floor, as at Homburg. In all bath houses of this character, the pipes or header systems are hung in racks in the casement, where they can be reached at once in case of a break. The Homburg management prefers pure copper to phosphor-bronze for the bath house plumbing. * * * * * *

BAD BRÜCKENAU.

On the southwestern slopes of the Rhone mountains, in the beautiful valley of a crystal mountain stream, the Sinn, lies Bad Brückenau, perhaps the most delightful spot in this charming valley. Between meadows and forested slopes rises this distinguished watering place with its fine monumental buildings and inviting villas — a watering-place to an exceptional degree suited for the stay of sick and convalescent people. The thickly-wooded beech and oak forests, intermingled with pine, spread out directly from the watering-place, affording hours of the most pleasant walks, and ranks with their ancient lineage with the finest in all Germany.

The medicinal springs, although already known for many years, first excited the attention of the then Bishop of Fulda, about the middle of the eighteenth century. The latter caused them to be built in 1747, so that the origin of the place and the recognition of its medicinal properties dates really from this period. King Ludwig I, of Bavaria, made it his favorite watering-place for twenty-six summers and decorated it with the beautifully situated Kursaal building, in front of which the bronz statute of the King was erected, the latter being unveiled in 1897 on the occasion of the celebration of the 150th year of existence of the place. In 1857 the watering place was distinguished by a lengthy stay for Kur purposes of H. M., the Empress of Russia, and in 1898 by that of H. M., Empress Elizabeth of Austria.

The climatic position is very sheltered and healthy. At an elevation of 300 meters above sea level the average summer temperature is 17.5 deg. centigrade; the air contains a large percentage of ozone, on account of the surrounding forests. The condition of the soil in the neighborhood shows a rich variation. The surroundings form a large natural park with roads and paths on the level, and walks varying from a gentle to a steep stone slope in every variety, so that Bad Brückenau besides its climatic properties, also finds recognition on account of those of its soil. The blossoming in the months of May and June is incomparably beautiful, and this time of the year is reckoned as the most attractive for Bad Brückenau. The hygienic arrangements are the best imaginable, and there is an excellent spring water supply service and a complete sewerage system.

Season: From the beginning of May to the 15th of September. The number of visitors and the export of the waters show an important increase from year to year.

NUMBER OF VISITORS.		EXPORT OF WERNARZ WATER.
1896.........	1497	51,356 bottles
1900.........	2554	209,873 bottles
1905.........	3609	354,386 bottles
1910.........	4692	490,995 bottles

Dues. Fifteen Mk. for one person, for each further member of the family 5 Mk.; for children under 15, 2 Mk.; servants, 2 Mk. Approved medical men are free from dues, together with their families, and receive free steel-baths for their own use (but not for the members of their families).

Amusements. The Kur Band performs daily in the morning from 7:30 to 9; in the afternoon from 3 to 4, and in the evening from 5:30 to 7 on the Kurplatz. Concerts, reunions, garden parties, theatrical performances, appearances of artists; games, such as lawn tennis, croquet, etc., are provided for in plenty. Music and reading-room in the Royal Kursaal Building. Post and telegraph offices; telephone in the Inspectionsgebaude. * * *

PLANT EQUIPMENT.

The arrangement of pit, reservoir and elevated tank at Brückenau is almost identical with the scheme used at Homburg. They have shown a little better judgment in the construction of the reservoir, it being not so deep, and much nearer the surface. When you consider that the cost of construction varies as the square of the depth, quite a saving is made by adopting the Brückenau system in preference to the Homburg system. As shown in the sketch, the water is first collected in a concrete pit. A pump is placed near the pit, with the pump valve submerged in the water, conveying the water from the pit to the reservoir, where it is stored under a gas pressure of forty-two pounds per square inch. Another pump forces the water from the reservoir to the elevated tank, located on top of the bath house. This tank acts as an expansion tank, and also holds the pressure on the water system; which is an absolutely necessity as this water containing CO_2 gas must be kept under pressure at all times.

The water falls from the elevated tank to the bath house by gravity, and is heated in the tub to a temperature of 98° F. The heating is accomplished by means of an especially designed and constructed apparatus, the details of which are shown in my drawing. The apparatus consists of a coil of steam pipe constructed of phosphor-bronze, which may be lowered into the water or placed against the wall, as desired. This pipe is also used to heat the room, and in the winter time, the system is no doubt efficient, as it is not necessary to turn off the heat. In the summer, however, the heat must be shut out of the coils, and when the bath is to be warmed it is necessary to reheat the coils before the water can be heated. This, to my mind, is objectionable, and I believe that we can design and construct a small electric heater which will heat the water in from one to three minutes (where the Brückenau heats in from three to six minutes) and do it as cheaply as we could with steam, as the electricity would only be used for short spaces of time. My drawing shows the general plan and arrangement of apparatus.

SPRING AND SPRING HOUSE.

The springs at Brückenau have been centered in such a way that they add greatly to the beauties of the park surrounding the plant. A small spring house has been constructed over the spring, with the sides open and the roof dome-shaped and supported on stone pillars. The floor of the spring house is composed of various layers, situated at differest elevations, so that a series of depressions lead down to the spring proper. The spring is covered with an ornamental glass and phosphor-bronze cover, shaped like a crown; or in some cases the spring is nearly covered and a single jet of water plays in the centre. As these waters are used for both drinking and bathing, a pump is located at each spring, but as the spring is used for ornamental purposes, the pump is placed outside the building, and a concrete conduit leads from the building to it. The conduit is located at the bottom of the pit, so that there is always a working head on the pump cylinder and the pump is always submerged.

Vine covered trellises lead from one spring to another in all directions, giving a pleasing appearance to the park. The water for drinking purpose is taken at the spring.

BOTTLING WORKS.

At Brückenau a bottling plant is in operation which deserves special mention for the reason that it is a radical departure from the standard methods of bottling water. The water is bottled in its natural state, care being taken to capture the water and convey it to the bottling works without loss of gas, or with chemical change of any kind due to unusual agitation or frictional resistance. This is accomplished as follows:

At the bottom of the concrete pit constructed around the spring, a concrete conduit is build leading the water from the bottom of the pit to a point in the basement of the bottling house, located at a lower level than the bottom of the pit so that the water will flow from the pit to the basement by gravity. The water flows to the machine where it is bottled.

The bottles are then placed on a traveling belt and conveyed to the first floor, where they are corked and labelled.

By this method the water is captured under pressure. It is not carbonated, but it bottled with a maximum saturation of CO_2, 20% of its volume being gas. It is in all respects a natural mineral water without the addition or subtraction of any chemical constituents during the bottling operations. The plant is not expensive, for by this method a minimum amount of bottling machinery is required.

WIESBADEN.

Wiesbaden is located in one of the most beautiful parts of Germany, on the world famous Rhine. It lies in a lovely valley near the foothills of the Taunus mountains. It has an altitude of about 386 feet above sea level, and can be reached by train in about thirty minutes from Frankfort-on-Main. The city possesses a good water system, an efficient sewer system, and the town presented a state of cleanliness superior to any other town visited, excepting Harrogate. The temperature of the summer months are about the same as at Bad Homburg, while the winters are as mild as anywhere in Germany, due no doubt to the surrounding hills of the Taunus mountains.

The bathing establishment consists of a Kurhaus, to my mind the finest in Europe; the Kaiser Friedrich Bad, the most pretentious bath house ever erected, the very acme of decorative extravagance; a small bath house, Wilhelm's Heilanstalt, founded by Emperor Wilhelm I, for officers and soldiers of the German army and navy; the Schützenhof, another unpretentious bath house, with a spring and bath rooms, also lodging accommodations; the Kurpark, and a few small drink halls. A great many establishments have their own springs, and usually operate as a combined bath house and hotel. Many other hotels have water rights secured from the city which controls the springs, and offer baths to their lodgers. The Kurpark is not large, but is located near the Kurhaus, and is well planned. The workmanship at Wiesbaden far excelled any place I saw, and I believe far outclasses Bad Kissingen for design and general arrangement.

Complete plans of the Kaiser Friedrich Bad are herewith submitted, and the general arrangement should be followed at Saratoga. One bad feature at Wiesbaden is that the Kaiser Friedrich Bad and the drink halls are separated from the Kurhaus and Kurpark. The establishment would be much more pretentious if it could be shown collectively.

CHARACTER OF SPRINGS.

The springs at Wiesbaden are not saline springs, whose waters attain a temperature of 155 deg. F. They are used for bathing, drinking, and inhaling. There are hundreds of springs in Wiesbaden. Every man that digs a cellar finds a spring, but the city owes its fame to two large springs called the "Adlerquelle" and "Kochbrunnen," situated in the heart of the city. These two springs furnish enough water for several hotels and the Kaiser Friedrich Bad. All of these springs show about the same analysis.

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The water from these springs bubbles to the surface, and no well is necessary. The earth is cleared away to the rock and a concrete curb or stone pit is placed at the opening, from which the water flows by gravity to the pumps located in the basement of the hotels and bath houses.

At each spring a drink hall is erected. It is as a rule a very simple structure, consisting of one room erected above the spring. The water is taken from the concrete pit at the mouth of the spring in a heavy glass tumbler, and passed direct to the patient. These drink halls should perhaps more properly be called spring houses, for they simply house the spring; being constructed from stone, and having a dome-shaped roof.

The same baths are given as at Homburg.

MECHANICAL EQUIPMENT AND METHOD OF HANDLING THE MINERAL WATERS.

The problem of pumping these mineral waters is rather simple, as there is no CO_2 contained in the waters, at least not enough to trouble to save it. They simply have to pump the water as we do fresh water in America, care being taken to supply pipes and equipment that will withstand the action of the mineral water. Tin-lined pipes, copper pipes, and copper valves in the pumps have proven efficient.

As the water is too hot to use for bathing purposes it must be cooled before it is run in the bath. This is accomplished in a rather unique, interesting, and very economic manner. As they must have cool mineral water and hot fresh water for the different kinds of baths given, they use the hot mineral water to heat the cold fresh water, and the cold fresh water to cool the hot mineral water. This is done by placing copper coils in a concrete reservoir. The reservoir is filled with hot mineral water and cold fresh water is passed through the copper coils. As the fresh water becomes hotter the mineral water becomes cooler. This change of temperature takes place until equilibrium is reached.

The attached drawings show the general scheme as used at Wiesbaden. * * * * * *

HARROGATE.

Harrogate is located in Northern England, a six-hours' ride from London. It has about the same climate as Saratoga, but the topographical conditions are not as pleasing to the eye as the charming and beautiful scenery surrounding Saratoga.

The plant is located in the heart of the city, and consists of a beautiful park, the Kursaal, the Royal Bath House, the Victoria Bath House, and the Starbeck Baths. A good conception of the character and appearance can be obtained from the attached pictures.

Character of Mineral Springs. There are all told seventy-eight springs of different character scattered throughout the park district of Harrogate. Sixteen springs are used for internal administration, the remainder being devoted to bathing purposes. The method of capturing the waters is somewhat different from other European spas. An iron pipe lined with tin about fourteen inches in diameter is sunk in the spring to the rock only. No bore is made in the rock. The water does not flow at the mouth of the pipe, but as soon as the water reaches the maximum elevation or ground water level the pipe is pumped out and allowed to fill again. The capacity of these springs is not as large as that of flowing springs, and it is necessary to conserve every drop of water to supply the baths.

I could not obtain a chemical analysis of the water, but the following information is listed in the literature compiled by Mr. Buckland, the "energetic and far-seeing general manager."

CLASSIFICATION.

Sulphur Waters		The Old Sulphur Water.
Saline Sulphur.	Strong	The Strong Montpelier Sulphur Water.
	Mild	The Mild Sulphur Water. The Mild Montpelier Sulphur Water. The No. 36 Water. The Magnesia Water.
Alkaline Sulphur		The Starbeck Sulphur Water. The Beckwith Sulphur Water. The Harlow Car Sulphur Water.
Saline		The Crescent Saline Water.
Iron Waters	Saline Iron	The Kissingen Water. The Chloride of Iron Water. The Alum Well. The Alexandra Water.
	Pure Chalybeate	The Tewit Well. The John's Well. The Pure Chalybeate Well.

NOTE: The last three waters contain such a very small proportion of saline constituents that they may be justly termed Pure Chalybeates.

The bath houses at Harrogate are well arranged and of good design, yet I do not believe that any attempt should be made to reproduce any of these structures at Saratoga. We can do better working along American designs. I found the bath rooms well appointed, well equipped, and the baths more varied than at any place in Europe excepting Wiesbaden.

VARITIES OF BATHS.

Sulphur Baths:	Saline Sulphur..... Alkaline Sulphur....	Thermal, Strong, Mild. Beckwith Water, Starbeck Water.
Massage Baths:	The Harrogate Massage Douche (Aix-les-Bains System) The Vichy Douche.	
Massage:	Dry Massage, Vibratory Massage, Injunction.	
Douches:	The Harrogate Special Combination Douche, (with shower, wave, ascending, descending, or spinal douche), The Needle Douche, The Scotch Douche, The Sitz Douche.	
Hot Air Baths:	The Turkish Bath, The Dowsing Radiant Heat and Light Bath, The Greville Electric Hot Aair Bath, The Combined Double Light and Heat Treatment.	
Vapour Baths:	The Russian or General Vapour Bath, The Berthe Medicated Vapour Bath, The Berthollet or Local Vapour Bath,	
Electric Treatments:	The Electric Immersion Bath with plain or Beckwith Water, The Electric Light and Ozone, The D'Arsonval High Frequency Current, The X Rays, Cataphoresis and Ionic Medication.	

Local Applications:	The Liver Pack, The Nasal Douche, The Throat Spray, Medicated Inhalation.
Other Varieties of Baths:	The Plombiéres Bath and Douche, The Nauheim Bath, The Oxygen Bath, The Schwalbach Bath, The Peat or Mud Bath, plain or with the additional of either Mineral Water, Brine, or Electric Current, The Brine Bath, The Pine Bath.

BATH.

The city of Bath is located in the valley of the Somerset Avon, in South England. Bath has an equable climate, cool in the summer and fairly moderate in winter. At the time I visited Bath, January 14, 1914, the farmers were plowing, and the grass was green. The city is about four hours' ride from London, or two hours' from South Hampton.

The mineral waters of Bath were used by the Romans as early as the first century, and for nearly 400 years the city of Bath, then called "Aquae Sulis," was a famous bathing center.

In 1882 many important discoveries were made, and the works near and in the present springs are undoubtedly the finest Roman remains in Europe. The waters are now flowing into the basins and curbing constructed by the Romans hundreds of years ago. These basins are constructed from stone obtained from the hills around Bath, and are entirely coated with lead, weighing forty pounds to the square foot. In one pool there are forty tons of lead used in covering it. The lead was no doubt secured from the Mendip Hills, in Somerset, for pigs of lead bearing the stamps of Claudius, Vespasian and Hadrian have been found there. The method used at Bath is the same as used by the Romans for capturing the springs. The spring is simply curbed at the point where the water bubbles from the ground. One huge octagonal Roman well has been excavated and is being used to-day. It was constructed to enclose the area of the principal spring. It is a fine example of masonry, enclosing a surface fifty feet by forty feet.

The bathing establishment at Bath consists of the Pump Room, The Queen's Baths, three springs, The Royal Baths, and a small garden.

" The Pump Room is a handsome eighteenth century apartment, where the radio-active waters are served from a many-sprayed fountain. The building is used as a Kurhaus. The room is used exclusively as a lounge for visitors taking the cure, and as a drink hall. A small orchestra plays in the gallery."

The Queen's Bath adjoins and conveniently communicates with the Pump Room. It is made up of fifty private baths and dressing-rooms, a large cooling-room, and rest rooms. Nearby, and connected by corridors, are the Concert Hall and Roman Promenade.

The Royal Baths. This bath house is located near the Pump Room, and is an elegant but rather simple structure. The building consists of several baths, located to the right and left of the spacious corridor, 200 feet in length. At the end of the corridor are luxuriously appointed cooling rooms, a smoking-room, and a balcony overlooking a large swimming pool.

A PARK SYSTEM AS AN ADJUNCT TO BATHING RESORTS.

An investigation of the different European spas has proved to me conclusively that a bathing resort can never be a financial success unless it is surrounded by properly designed parks. With this in mind I made a careful study of several European park designs. This was rather easy to accomplish as one of the Paris Park Commissioners obligingly showed me small plaster designs of all of the famous European parks. Thus I was able to accomplish in one day what otherwise would have taken several days of travel.

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The character of parks is determined by their origin, the natural conditions of the locality, the demands of those who use them, and maintenance. The earliest parks were creations or perhaps the conservation, of beautiful natural conditions, by the great land-owning nobility, for their own esthetic and sporting pleasures. The proprietors vied with one another in demanding and creating beautiful gardens and parks, sparing no effort or expense to excel, and from this origin came the beautiful villas of Italy, the great royal gardens of France and Germany and the beautiful natural estates of Great Britain.

Following these, there were set apart for the use of the common people simply open ground or wooded districts where the children could play games and the elders could rest in the quiet shade afforded. These were not dignified by the name of park until well along in the eighteenth century, although some of the great royal parks had come into the possession of the people for their undisputed use. During the last hundred years the area dedicated by the public to parks and playgrounds has steadily increased until now all the great cities are doing for the people what the nobility of a few centuries ago were doing for themselves, trying to surpass all others in the beauty, as well as the usefulness of their parks.

Up to a short time ago, conditions were such that parks were designed with a view toward ornamentation rather than to public use. But now the designer of parks largely eliminates the first factor and bases his design on the desirability of supplying the demands, or necessities, of the people, and endeavors in so doing to combine with the strictly utilitarian features an artistic beauty and proportion of setting as great as the natural conditions will permit. The demands and necessities of the people are much more nearly the same in all places than is generally supposed by those who give only casual thought to the question.

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In the designing of European parks, plaster models are made of the parks in nearly every instance for the consideration of the authority determining the design. The park directors in charge of the parks are generally given full charge of the designing of new parks or the reconstruction of old ones, and the results are on the whole very good. In some cases better results might have been obtained by employing men of wider experience; but as a class the directors and superintendents of public parks in Europe are exceptionally well qualified, and, holding their positions permanently, they became more and more valuable to the work as their experience and knowledge increases. * * * * * *

The mistakes made by park designers are the same the world over, and are often evident in European parks, just as they are in our American productions. Only a genius like Le Notre can, as in his work at Versailles, so rise above the general rule as to make it possible to use the informal products of Nature in most formal designs without spoiling the harmony of the picture by emphasizing the stunting and deforming of bushes and trees to conform with the wishes of the designer. And mistakes are made along the same line in endeavoring to produce " natural " results. Trees and shrubs are planted by rule and areas graded as nature should do them, but doesn't, and the result makes one feel the " scheme " as soon as one enters the park, and generally one resents it. Of course, the beauties and the charm of trees, grass and falling water are such that they cannot be entirely concealed, no matter what the design, but only in a few instances, either in Europe or in America, has a park designer been able to so combine and proportion the natural with the artificial that the result entirely conceals the means. * * * * * *

The attractions placed in parks vary somewhat in different countries, but not so much as might perhaps be imagined. The quiet, the beauty and the shade of trees are the greatest attractions and no features for attracting the public should be introduced which will lessen these qualities. * * * * * *

Plantation is made an important and desirable part of European parks, and the great trees seem to invite and call for rest and recreation. A park is or is not great, accordingly as it has or has not good trees and plantation. Another very important feature or attraction for any park are the green lawns. It is often difficult to maintain these smooth lawns and still allow the public the use of the park to any great extent. This is met in Europe by simply fencing off these parts of the park which are not deemed necessary to the use of the public, and allowing the other parts to be simply covered with gravel or coarse sand and used as much as the public shall desire. This method is neither artistic or necessary. There are many styles of guards used for the protection of lawn edges along walks and drives. The most common and satisfactory way is by the well known border beds of plants or flowers. The old stereotyped straightline beds of flowers are still to be found in some parks, but the general tendency is to place flowers very sparingly and to endeavor, in so far as is possible, to so distribute them throughout the space as to make them seem a more natural part of the landscape than do the great beds laid out in various geometrical forms.

The use of artificial features, such as fountains, vases, urns and statues is very common in the European parks, and in the proper proportion is the final touch which turns a very ordinary design into a success. The most effective and simple form of fountain is usually the single jet, surrounded by a low coping and showing against a background of green.

The lake in a park is one of the essential features — shrubbery, grass and water. Few, if any, parks are completely satisfactory without a sheet of water, and even those which are so fortunate as to lie on a body of natural dimensions are not complete without some internal waterways. The value of water in parks seems to be universally appreciated by park builders, and the fact that its introduction in almost any form will be delightful, makes it about the easiest of the three elements to handle. The canals, rivers and lakes are always the greatest and most attractive features in any landscape, and are of a positive value in the development of the beautiful in any city. * * * * * *

The driveways in the parks of Europe are very like our own, except that they are often bordered with heavy granite curbing; the walks immediately joining them, without any strip of planting between them. Usually the plantation is dense right up to the walks on either side, the space of the opening for the walk or drive being less in the European than in our own parks. Generally speaking the walks and drives are not very well surfaced, and are likely to be muddy and quite soft when the frost leaves them. Bridle paths are more common in Europe and many kind of material — slag, gravel, clay, etc — are used in surfacing them. Cinder surfaces are very uncommon. The width is extremely variable, running all the way from thirty down to five feet.

The lighting of the parks is generally ineffective, most of them being closed at night. The most general illuminant is gas, although electricity is being adopted in some places. The lighting seldom goes to any greater extent than the placing of a few lamps on the main thoroughfares.

Sanitary appliances are entirely inadequate, although very well cared for.

There is always a small supply of seats and benches, the greater part being in the hands of concessionaires, who provide chairs at about one cent an hour. The parks are almost universally enclosed with iron fences or walls, and are frequently closed at an early hour.

BOULEVARDS AND AVENUES.

The boulevards and avenues of the great European cities are mostly a surprise, if not a disappointment to those who expect to find them with trees, green grass and shrubbery. The trees are there, to be sure, and fine ones they are too, frequently more than two feet in diameter and 80 or 100 feet high. But any possibly parking or grass spaces are filled with concrete walks or gravelled. If seen when few people are about the effect is depressing, but if viewed in the late afternoon or evening, when the crowds are moving about in the shadows of the great trees, one forgets the absence of green in the pleasure experienced in watching the people enjoy themselves. There are, of course, some boulevards in most of the cities of such dimensions as to make it possible to retain grass and shrubbery without curtailing the usefulness of the avenue. Here, however, there are always fences about to protect the grass. Sometimes heavy traffic is not permitted on the boulevards, as is the case with us in most cities, but generally there is no distinction made between the heavier vehicles and those of lighter weight.

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The parks of Europe, while they have much, perhaps everything, that is attractive in statuary, fountains, stairways, balustrades and artistic design, are still more attractive because of the beauty and abundance of the trees, hedges, shrubbery, grass and water. The most beautiful parks are those where one finds himself forgetful of all else but the great splendid trees that surround him; the soft walls of closely clipped foliage that so charmingly lead him on and on to new and unexpected delights; the beautiful soft carpet of green grass, surrounded with banks of shrubbery of all shades of green, with a background of those eternal trees; the pool, basin or canal, mirroring in its own beautiful surface all those other exquisite things, all so charming that one feels he has finally found the spot where nothing more is to be desired. Such places are not to be found everywhere, but they do exist and, when found, prove conclusively that to be great and beautiful a park, no matter what other things it contains, must have trees, great trees, numberless trees; it must have shrubbery without limitation; it must have lawns, beautiful lawns, great lawns; it must have the beautiful reflectations to be found only in small pools and great lakes, and the delightful movement of water, unlimited abundance of water, playing in fountains and basins. With these things, if it has nothing else, a park can be one of the greatest parks of the world. Without them, it never can. A park then is what its lakes, lawns and plantations make it.

PROGRAM FOR SARATOGA.

(1) A concrete pit should be constructed at each well used for drinking and bathing purposes. The pit must extend below ground-water level, the deeper the better.

(2) All wells must be protected by means of a copper casing extending into the rock. The life of a well may be said to be uncertain. It may last hundreds of years if proper care is taken of it. A well passes through many kinds of rock, some hard and brittle, others soft and rotten. The heavy load above this soft rock causes it to crop out, thus closing up the bore of the well. Or, the water working along the sides of the drilled hole lubricates the rock, forms cavities, washes away small particles and causes the rock to crack and slip. The well is not only closed off, but filled up from the bottom. I have found two such cases at Saratoga, and

all wells should be opened up to their original bore and this copper tubing placed at once.

(3) At least one large bath house should be constructed, with a complete installation of modern bathing equipment. This house should be located in a park or near a park.

(4) One large drink hall should be constructed, where several kinds of waters may be served, hot or cold. This building should be near the bath house.

(5) Spring houses should be constructed over two or three of the springs in the city and arrangements made so that the people of Saratoga can secure water winter or summer.

(6) When work starts, a construction force should be organized and the following equipment purchased:

One No. 5 Traction, Keystone Drilling Co., well-drilling machine, Missouri Special for 1,000 feet.

(Specifications are omitted.)

(7) A chemical laboratory should be established, and the following equipment.

(Table of equipment is omitted.)

(8) All wells not in use should be closed.

(9) All wells should be so constructed that there is always a small flow, and after the well is properly constructed, the flow should never be stopped.

(10) If water is taken from a distance, wooden pipe should be used, and a pipe line provided for each well. Two or more waters should not be pumped through the same pipe line unless they are mixed and pumped at one and the same time.

(11) Copper should be used in place of phosphor-bronze.

(12) Any combination of copper and tin may be used, if it can be cheaply and promptly secured.

(13) A park system must be developed, and no pains or expense should be spared to create one of the most beautiful parks in the world. The foundation is there now, and nature has done so much for the reservation that the work is now a simple task.

(14) Additions to the above may be made as required, and as the business grows.

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NOTE.—For the convenience of your Commission I insert two papers, perhaps not easily accessible in America, but of evident value.

REPORT ON THE MINERAL WATERS OF BATH

BY PROFESSOR SIR WILLIAM RAMSAY, K. C. B., F. R. S.

Some years after my discovery of helium in 1895, Lord Rayleigh made an estimate of the amount present in the gases escaping from the King's Well, and found that in 10,000 volumes of these gases, there are twelve volumes of helium. Helium, like argon, is one of the "inert" gases, forming no chemical compounds, and therefore without any therapeutic action. Its presence in Continental mineral waters was demonstrated in 1896 by my then assistant, Dr. Travers, and myself, and M. Moureu, of the French Academy of Medicine, and M. Bouchard, have made extensive researches on mineral waters, chiefly French, and have found helium to be present in larger or smaller quantity in many of them.

The cause of the therapeutic action of such waters has been obscure; mere artificial mixtures of the very ordinary salts which they contain have been said not to produce the same effects as the use the waters fresh from the springs; and it was not evident how the presence of helium, curious though it might be, could be credited with such beneficial results as are undoubtedly produced by "taking the waters."

But in 1903, in conjunction with Mr. Frederick Soddy, I solved the riddle by discovering that helium is one of the products of change of radium, and that its presence in the water is an indication that radium has been concerned in its production. As the chemistry of such substances is quite modern, perhaps a short explanation of what occurs may form a fitting preface to this report.

The element radium was discovered in 1898, in a hard, black mineral named pitchblende, by Madame Curie. She has recently prepared the metal in minute quantity; it is a hard, white metal, rapidly oxidized by air, and at once attacked by water; it closely resembles calcium, the metal of which ordinary lime is the oxide, and which is now manufactured on a semi-commercial scale. Like calcium, it forms salts, a few of which have been investigated; for instance, the sulphate and the carbonate, like those of calcium, are nearly insoluble in water; the chloride and the bromide are easily soluble. It is now being extracted from Cornish pitchblende in the works of the Radium Corporation at Limehouse in East London, and as bromide it meets with a ready sale at the enormous price of £20 per milligram, equivalent to more than £500,000 per ounce. For the cure of rodent ulcer, and for certain skin affections, its curative effects are undoubted; and quantities of from 10 to 100 milligrams are now being bought for use in hospitals and private practice.

Although an element, radium is unstable; that is, it is continually changing into another body, also "elementary." During this change, it parts with helium, each atom of radium furnishing one atom of helium. As atom after atom of radium undergoes this change, miniature explosions take place, the effect being that atoms of helium are shot out with enormous velocity; they can be recognized by placing near the decomposing particle of radium a small screen of card, covered with a crystalline deposit of sulphide of zinc. As each atom of helium impinges on the screen a flash of light occurs. That this is the case was discovered by Sir William Crookes; and Professor Rutherford, by counting the number of flashes, and by other means, too intricate to be described here, has succeeded in demonstrating that each atom of radium emits one atom of helium. These atoms of helium in rapid motion have been termed "A," or alpha-rays. Their therapeutic effect is practically unknown; but they contain energy, or power of doing work, some twenty times greater than the other radiations termed "B" (beta) and "G" (gamma), which also accompany the decompositions of the products of radium.

Having shot out its particle of helium, the atom of radium is no longer radium, but a gas, to which the name "radium emanation" was given by Professor Rutherford and Mr. Soddy, but which, now that its properties and its atomic weight have been investigated, is better known as "niton." The rate of change of radium into niton is a very slow one. In theory, a given weight of radium should take an infinite time to change completely into niton and helium, because, as the decay goes on, less and less of the radium is left, and that smaller quantity gives off proportionately less niton and helium. In order to avoid the infinitesimal, it has been agreed to speak of the "half-period of decay," which is a perfectly definite interval of time. An ounce of radium, for example, after a period of 1,760 years, would have half changed into niton and helium, while half an ounce of radium would be left unchanged. After a further period of 1,760 years, half of the half-ounce, i. e., a quarter of an ounce of radium would be left, the other quarter ounce having produced niton and helium. This process would go on indefinitely and it is thus evident why the "half-period of decay" has been chosen as a means of measurement.

In collaboration, first with Mr. Soddy, and more recently with my present assistant, Dr. Whytlaw-Gray, I have investigated this gas, niton. Like argon or helium, it is inert; that is, it forms no chemical compounds. In another sense, however, it is not inert, for, as shown by Rutherford and Soddy, it itself has only an ephemeral existence; in 3.86, or say four days, it has half changed. As the activity of these substances depends on their rate of change, niton is a much more potent agent, weight for weight, than radium; indeed, the potency of radium may be ascribed to the extent of at least 75 per cent. to the action of its product, niton.

Like all other gases, niton is compressible; it can be converted into a liquid at ordinary temperature by compression alone, and the liquid can be seen in a very narrow-bore tube, as minute in bore as the finest needle is thick; naturally, a microscope must be used to see the liquid. It is colorless to look through, like water. Like water, too, it freezes when cooled to a solid something like ice, I suppose; I say, "I suppose" because it is impossible to see the solid as such. Solid niton causes the glass or silica tube in which it is necessary to confine it to glow with a brilliant light, comparable with that of a minute arc-light. The liquid, too, causes the glass to glow with a fairly bright violet light, so that if a tube containing it be looked at in the dark, the violet glow is considerable, but if looked through, against a light, the liquid niton is water-clear. Dr. Gray and I were successful in weighing this gas, and so in determining its atomic weight; this corresponds to the atomic weight of radium less that of an atom of helium; and we succeeded furthermore in weighing by difference the helium which the niton had produced in the course of its decomposition into further products.

I have stated that the half-period of decay of niton is about 4 days; in 8 days only a quarter is left; in 12 days an eighth; in 16 days a sixteenth; in 20 days a thirty-second; in 24 days a sixty-fourth, and in 29 days one 128th. Practically in a month it has all changed.

Its products, except helium which is a gas, are solids; they have been named " radium A, B, C, D," etc., by Professor Rutherford; first, their half-period of decay is too short, and they change before it is possible to handle them; and second, it is much easier to deal with a gas, owing to the much larger comparative volume which it occupies. But it is known that radium A, B and C have short periods of decay, such that in three hours they have almost entirely changed into radium D. On the other hand, radium D has a much longer half-period of decay, viz., about fourteen years, and no doubt it will be investigated. But from a therapeutic point of view, it has little interest, for its change into further products takes place so slowly; and also without any " rays."

The B, or beta-rays, are evolved during the change of radium into niton; and also during the subsequent changes of radium A and C into radium D. They are of a wholly different nature from the alpha-rays; they are, to use ordinary language, not reckoned as an element, but are of the nature of negative electricity. Personally I should be inclined to class negative electricity as a " substance," or as " matter;" but its properties are unique, and differentiate it from other varieties of matter. The " corpuscles " or atoms of electricity, now commonly termed " electrons," have been largely investigated; we owe much to the work of Sir J. J. Thomson, who has determined their approximate weight, and the velocity with which they move through space. They are identical, except in rate of motion, with the " cathode rays " produced in the interior of a Roentgen-ray " tube " or bulb. When they are caused to impinge on an " anti-cathode " or piece of refractory metal, they produced what are commonly known as " Roentgen-rays," familiar to all by their power of penetrating flesh and blood, but not so easily bone.

It is the beta-rays which have been chiefly used for therapeutic purposes. While alpha-rays, that is atoms of helium, like other gases, can be confined in glass or metal vessels, beta-rays pass through; the amount passing naturally depends on the thickness of the walls of the vessel. The alpha-rays, for example, given off from niton confined in a glass tube, do not pass through the glass; the beta-rays, due to the products of change of the niton, do pass through; and by interposing metal screens of foil of different thicknesses, a greater or smaller quantity may be allowed to impinge on the skin.

A third class of rays is also evolved, during the emission of beta-rays, which have been termed gamma-rays. It is not decided as yet what is their true nature. They have great penetrative power; indeed, three inches thickness of metallic lead is not sufficient entirely to stop them. They too are sometimes employed for curative purposes. It is suggested that they more resemble rays of light; that they are not "matter" but waves in the ether which surrounds and interpenetrates all matter.

ON THE BALNEOLOGICAL ASPECT OF RADIUM.

An Address at the Balneological Congress, held in Budapest, April, 1912, by Prof. Ede Weiss, M. D.,

Vice-President of the Balneological Society, Budapest.

(From "*The Medical Press,*" 5th *June*, 1912.)

It is some five years since investigations were made in Hungary relating to the radium contents of some mineral waters; these investigations resulted in the discovery that in rheumatism and gout the efficaciousness of a certain water is in direct proportion to its radium content. They found that even the celebrated mineral water aperients contain more or less radium, this contributing to their action in a fairly large measure. The investigations have also shown that the emanation is possessed of the nature of a volatile gas, consequently it evaporates very quickly, and it gets transformed also in a closed jar, so that in three or four days not even traces remain. This fact, which seems to prove the advantage of using mineral waters at the very spring, and the fact that sometimes on patients being treated with artificial emanations, similar reactions are seen to those occurring in some watering places, have led to the justifiable conclusion that among the active elements of the mineral waters radium occupies an important place. Even some over-enthusiasts proclaimed the extreme view that radium is not only the most important, but, so to say, the exclusive acting principle of most mineral waters. However, this is a great mistake. At the German Balneological Congress of last year, I clearly demonstrated that it is a mistake to identify any complex mineral water exclusively on the ground of its radium content with, say, an ordinary well-water artificially activated with emanation. This exaggeration will necessarily lead from one side to the over-estimation of emanation, and from the other side to the neglect of the physical and chemical components of the respective mineral waters. If we reflect how not indifferent on the skin and mucous membranes the temperature and the quality and quantity of the salts contained therein are, it is very easy to understand that a mineral water, capable of producing hyperaemia by reason of its temperature and its qualities and at the top of these by its emanation of radium, is particularly apt to provoke near and far reflex action. And so it seems that balneology in its rejoicing with its newborn baby, radium, is apt to forget that it is not decent to treat its other children as a stepmother. * * * * *

Beyond the mentioned different methods of external application recourse has been taken in internal medicine also to other possibilities of application. Nominally, besides the baths containing emanation, drinking cures and inhalation with air saturated with emanation have been introduced.

As for the baths, the majority of authors agree that emanation does not get into the organism through the skin, but it exclusively gets into the blood through the lung, which absorbs the emanation just as eagerly and as quickly as it discharges it.

However, in opposition to these facts, some authors are arguing on grounds of their own experiences, that if the baths are taken for a sufficiently long time, then considerable emanation-quantity reaches the organism through the skin.

It is an old and much-discussed question of balneology — what can the skin absorb, and what not? The absorbing capacity of the skin in general being very moderate, there is some difference of opinion ruling in this matter, though through skin irritation we are able to produce extraordinary effects from the outside, without the respective matters having become absorbed through the skin. And thus, without doubt, emanation products must have effect through the skin, too.

As to the drinking cure, it became clear that the emanation having got into the stomach, it gets quickly enough into the blood current by way of absorption, and is discharged in from three to four hours with the expired air. Therefore, it is a general rule to order a drink cure three or four times a day, in order that thus the juices of the body should stand under the longer emanation action.

In the ranks of the historical order the inhalation system is the last one, but in respect of efficaciousness its prominence brought it easily in the front row.

This latter fact shows what extraordinary importance natural basin-baths may have from the point of view of emanation-inhalation and particularly valuable are those which, by reason of their contents, continully fill the air with emanation, like an immense emanatorium.

* * * * * * *

As to the mutual relation of drinking and inhalation cures, I agree with Dr. Plesch, of Rajecz, Hungary, who has demonstrated that the blood takes up about 10 per cent. less emanation than water; therefore, the emanation behaves itself towards the blood just as a strange gas. The emanation content of the blood rises in direct proportion to the tension of the emanation and the time of exposure; the emanation content is the greater, the quieter the respective individual is. Whilst through inhalation the emanation gets into the capillary vessels of the lung and hence into the whole body, with a drink cure it gets from the intestines through the liver into the vena cava inferior; or through the ductus thoracicus into the vena cava superior, that is to say, into the lung, whence it is discharged with the breath, without circulating in the whole body. By reason of this fact Plesch suggests the combination of inhalation cure with the drink cure.

* * * * * * *

As for the therapeutic value of radium and its emanation at present, there is no doubt as to its usefulness in dermatological cases, some neoplasms, and neuralgias. I, for my part, have been particularly interested to observe the results of emanation in rheumatic and gouty affections. The last contribution on this subject appeared in the "*Berliner Klinische Wochenschrift,*" from Professor His, who describes his experiences with 100 chronic rheumatic patients and twenty-eight gouty cases. The patients have been treated in the Lowenthal inhalatorium, recte emanatorium; of course, combined with the strictest diet and regimen. As regards these mentioned rheumatic patients, it seems, as far as I can judge from His's statistical data, the results cannot be compared with those attained in corresponding thermal baths, as, for instance, in Postyen, though it is to be admitted that in some exceptional cases the results have been surprising. According to His, the result is the greater the younger the subject and the fresher the case. In gout, the results were paramount, not only from a practical point of view, but they were extraordinarily interesting also theoretically. Among twenty-eight patients, only four did not improve, all the others improved considerably. The chief moment was when the uricaemia did accurately cease in fifteen out of eighteen cases — that is to say, while before treatment uric acid could be traced in the urine, after a couple of weeks it entirely disappeared from the blood. There were only two or three who were refractory to treatment.

A BRIEF OUTLINE OF THE CO_2 BATH AND ITS USES.

BY

Albert Warren Ferris, A. M., M. D.,

Superintending Director for the Commissioners of the State Reservation at Saratoga Springs, N. Y.

Hydropathy, or water-cure, practiced by empiries and charlatans, deservedly fell into disrepute and is near extinction. Even its name is etymologically incorrect. Hydrotherapy, the science of the use of water as a remedial agent, ranks to-day as a subdivision of therapeutics, equal in importance with electrical treatment or the administration of drugs. Yet it has never had the attention paid it which it merits, in spite of repeated examples of brilliant results published for generations in medical and lay periodicals, and in spite of emphatic statements by eminent teachers and clinicians who have mastered its technique and applied its principles with physiological sagacity. Medical colleges, always slow to increase their administrative expenses by extending their curricula, have with great reluctance considered the creation of chairs of hydrotherapy. Dispensaries and clinics, in a very few cases, grudgingly establish hydrotherapeutic departments and then suffer them to languish, in most instances, because of insufficient consideration by the physicians serving in general medicine departments, and because of the peculiar defensive and offensive attitude toward any new suggestions which characterize many institutional physicians and nurses.

Ernst Brand, of Stettin, Germany, published in 1861 the method he had devised of treating typhoid fever with baths of cold water at exactly prescribed temperatures, at regular intervals and for definite periods, and accompanied by friction. He claimed and proved that his method resulted in a great reduction in the mortality from this dread disease. Libermeister, Jürgensen, Ziemssen and other established authorities approved, advocated and practiced his method. Yet over twenty years of argument and objection followed, and the greatest reluctance was exhibited in many countries to the abandonment of the drug or "expectant" treatments of typhoid, with their customary mortality of 22 to 32 per cent., and the substitution of the Brand bath method, with its mortality of 3 to 8 per cent. To this day there are scores of unconvinced physicians of limited education, and hundreds of lay pundits who are simply bursting with pseudo-medicine learned from the man in the street and from the newspaper paragraph, who advise or insist that "other means" be tried first, while the recoverable typhoid sufferer is drifting and sinking into the tenacious clutches of death. Who can calculate how many hundreds of thousands of valuable lives, sure to have been lost under the drug or "expectant" treatment of typhoid, have been saved by the use of the Brand bath? And yet it is opposed to-day in certain quarters.

What wonder, then, that the medical apostles of general hydrotherapy have been forced by want of interest, ridicule or absolute hostility, to fight every inch of the way to recognition and ordinarily decent professional consideration?

Our own Baruch, the most eminent exponent of hydrotherapy in America, sadly disturbed the equanimity of several eminent delegates to a congress of physicians at London, England, in 1913, by advocating a certain form of hydrotherapy in insomnia. He was informed that drugs only were being considered in the discussion of hypnotics. While advocating the use of an American nostrum, they were unwilling to discuss a very natural and successful measure of demonstrated usefulness in securing sleep.

Dr. A. Vogl, medical director of the Bavarian army, wrote as long ago as 1896, "The insufficient education of medical men in physical therapeutics, especially in hydrotherapy, is a serious defect, which injures physicians in their earlier practice, and for which it is difficult to compensate later." He adds, "Hydrotherapy should be taught in its entirety, as Winternitz has done, upon a physiological basis. By lectures and clinical demonstrations it should be brought before the student just as other therapeutic agents and methods are offered to him — as obligatory branches of study. When this is done, hydrotherapy will become the property of all physicians, and not be practiced as a special and distinct method."

Germany was aroused and took an advanced position, years ago, in the teaching and practice of hydrotherapy; but America is still lagging behind. In spite of the teaching and example of Baruch, the American master, in spite of Jacobi, Brayton Ball, William H. Draper, James, H. P. Loomis, Peterson and Gilman Thompson of New York, and Meigs, Wilson, Tyson and Musser of Philadelphia, it must be said that the profession of neither city takes a real interest in hydrotherapy. It is but sporadically used and but superficially grasped, as even certain well-known text books bear witness; for in them the explanation of the procedures and their rationale are very meagre, and the suggested methods of prescribing are almost always so incomplete and ineffective as to suggest helpless ignorance of the practice of this very valuable form of treatment.

Hence poor people or those of limited means do not get hydrotherapeutic treatment in our cities, and the greater number of well-to-do patients are sent out of town to sanitariums or to foreign health resorts, where full equipment and skillful treatment are well nigh assured.

A well-known college clinic in New York has allowed its hydrotherapeutic equipment to be abandoned, interest in hydrotherapy having so far failed of realization that neither the general faculty nor the chiefs of other departments of the clinic have sufficient regard for it; and also young medical graduates who will interest themselves sufficiently to maintain the department, as assistant physicians, are apparently unobtainable.

It is amazing that very many physicians have never paid any attention to hydrotherapy and have not a single work on the subject in their libraries. Such physicians naturally, when interrogated by patients or others, find it safer and easier to conceal their ignorance by deriding the practice, and thus the great public is denied information regarding a most valuable form of treatment. Yet a superficial acquaintance with the physiologic basis of hydrotherapy is easily obtained. Everyone realizes the peripheral stimulation that follows hot or cold baths; but few appreciate the fact that powerful hygienic, dietetic and therapeutic factors are thus available. Systematic repetition of stimulation or depression through the peripheral nerves results in a permanent condition, following temporary reaction. Following the nerve stimulation, secondary effects in vascular territories occur through conveyed impulses, modifying function according to the change in the supply of nutritive material.

Among the most important thermic and mechanical effects of hydrotherapy are the vascular contractions and dilatations secured, and also the changes in the vigor and frequency of the heart's contraction, through the transmission of neural impulses to the muscular tissues, cardiac and vascular. Changes in the blood pressure; alteration in the constitution of the blood (leucocytosis as well as an increase in erythrocytes following the application of cold, with a moderate reduction in erythrocytes following heat, in general); increase in the normal metabolic activity; change in the functions of excretion and secretion, as clearly observed in the case of skin, kidneys, alimentary tract and glandular apparatus; all these are effected by proper hydrotherapeutic procedures when fresh, or sweet, water is employed.

MINERAL BATHS.

We turn now, in this rapid survey, to mineral baths, by which term we mean baths whose water contain a large proportion of solid or gaseous substances in solution. These substances excite a form of cutaneous reaction which differs from that noted in the baths prepared with fresh water. Water is absorbed, as in all baths at moderato temperatures, as shown in an increase of weight, but none of tho dissolved solid constituents of the mineral water is absorbed, as demonstrated by the experiments of Winternitz and of Rohrig, Lehmann, Thompson, Rabateau and others. The gases permeate the skin, however, exerting an irritation upon the peripheral nerves, hence the distinctive chemical stimulation. This stimulation causes a dilatation of the peripheral capillaries, and an impression, through reflex influence, on the centres regulating the heart action as well as the nervous system, whereby increased oxidation results and metabolism is augmented. Osmosis to a varying extent is very probable, since the skin separates two saline fluids of different specific gravity, the blood and the mineral water. If no actual diffusion takes place, at least the blood and the intercellular fluid proceed toward the surface of the body, producing a peripheral hyperaemia.

The carbonic dioxide bath is variously termed "acid", "effervescing" or "carbonated", and these names are properly used when the waters employed are highly charged with CO_2, and contain varying and even negligible quantities of solids, always excepting the special CO_2 baths used in the Nauheim system for treatment of certain heart conditions.

The results of the CO_2 baths are due to the following agencies:

1. The temperature of the bath.
2. The CO_2.
3. The radio-activity of the water.
4. The presence of special chemical irritants such as the calcium chloride and magnesium chloride in the Nauheim bath system.

The gas stimulates the skin, causing a rosy tint as it clings in minute bubbles to the entire submerged body surface. "The irritating effect upon the sensory centripetal nerves, as well as upon the heat nerves, is manifested in a sense of marked prickling, as well as a sense of intense heat, particularly in the genital region," says Kisch. "With the redness of the skin is associated contraction of the unstriated muscular fibers, which is especially marked in the scrotum and in the nipples. The tactile sensibility of the skin is materially increased. The stimulating effect of the carbon dioxide upon the sensory cutaneous nerves extends to the nerve-centres, and, through radiation and reflex action, throughout the entire nervous system; and thus induces a feeling of general well-being as well as an increase in all the nutritive processes".

HEART AND ARTERIAL DISEASE.

The action of the CO_2 bath on the heart and vascular system is of prime importance. There have been wild enthusiasts who claim impossible results, as well as prejudiced pessimists, who shut their eyes to all testimony and refuse to believe the truth. Over 75 years of observation and study have resulted in the elaboration of a system of tremendous value in cardio-vascular diseases, when carefully prescribed, probably applied, and constantly supervised by a competent physician. The testimony of the orthodiagram is conclusive. The subjective symptoms of the patient three months or more after the termination of the CO_2 bath treatment are proof enough for the practitioner.

In the treatment of incipient arterio-sclerosis, the CO_2 bath is employed with success. In many cases with marked sclerotic changes and a high blood pressure, the treatment has re-established the circulatory equilibrium, relieved an engorged liver or congested kidneys, and re-established in these organs a relatively normal circulation. In an engorged liver the poison generated during inactivity of the hepatic cells does the most harm. The CO_2 bath increases the capacity of the cutaneous vessels, and obstruction is removed from the internal organs through the distribution of a quantity of blood, thus lessening the demands made on the cardiac muscle.

In many forms of kidney disease the carbonic oxide bath is of service as adapted to the individual case, assisted by strict diet, proper exercise and out-of-door life.

Chronic muscular rheumatism, lumbago and many forms of neuritis, are markedly and rapidly benefited. In addition to the carbonated baths, fomentations and douches of mineral water, with massage, are often of avail in obstinate cases. Articular rheumatism is most favorably influenced by the CO_2 baths, and the heart is protected from damage by very early treatment instituted shortly after the termination of the acute stage. Late cases of articular rheumatism, even of chronic character from the start, are ameliorated by the CO_2 baths. In many cases, pain, stiffness and disability disappear without any other treatment.

In connection with dietetic control, passive and active exercises, CO_2 baths are beneficial in arthritis, the nutritional disturbance of joint cartilage. Probably a large measure of the success of the Saratoga bathing waters in joint affections is due to their radioactivity.

Obesity should receive such treatment as the condition of the heart, kidneys and joints indicates. Special diets should be prescribed according to the condition present, and reduction is secured by means of various water, electric, and other heat treatments. Suitable exercises, used passively and actively, following a course of close study of each case. In many instances, difficult breathing, swelling of the extremities, weak heart action, constipation, stiffness in the joints, etc., disappear as the treatment advances. In many cases dullness, apathy and irritability are removed very early.

Carbonic oxide baths are very useful in restoring poise, removing nervousness and irritability, and alleviating insomnia, as well as in building up tissue in the victims of neurasthenia, or "nerve fag".

In cases of chronic alcoholic or drug addiction, the CO_2 baths constitute a very important part of the rapid withdrawal method and in the constant care through which new tone and vigor are obtained. The skin is influenced to greater activity and the general nutrition improves rapidly with the baths as adjuncts to the ordinary treatment.

Exhaustion, following acute disease or surgical operation, is an indication for the employment of careful, graduated CO_2 baths.

Elimination is secured by placing the patient in a bath at 98°, and heating it up gradually, while he is in the tub, to 110° or less, or to 112°, if reduction is the object. Following withdrawal from the tub, a spray at 105° to 85° will check the perspiration, or a hot pack will encourage it, if desired. It is usually followed by refreshing sleep. The duration of the tub bath should be from ten to twelve minutes.

The sedative, or calmative, bath should be administered at the temperature of 98° to 100°, and continue for 8 or 10 minutes, though some patients should not be subjected to over 95° of the CO_2 bath. A spray at the temperature of the bath and then cooled rapidly to 88° should follow emergence from the tub.

For a tonic effect, the bath is administered at 78° to 85°, for 2 to 5 minutes.

RADIOACTIVITY.

The split products of radium, resulting from its decomposition, are called the alpha, beta and gamma rays. The alpha rays are atoms of helium in very rapid motion. After these atoms are separated, or projected, the residual radium is in gaseous form and is termed radium emanation, or niton. During the change into niton, beta rays are evolved. These resemble negative electricity and are the chief therapeutically active rays. They have the same penetrative power as the Roentgen Rays, and are practically identical with the cathode rays of the Roentgen tube. The gamma rays penetrate to a great depth, and are also of therapeutic value, but as yet are less understood than the beta rays.

Radioactivity is efficacious in inflammatory conditions, gout, rheumatism, myalgias, neuralgias, sciatica, etc., apparently because of its power to cause decomposition of uric acid compounds and other products of defective or perverted metabolism and perhaps because of its effecting increased activity of enzymes and ferments, and because of its bactericidal properties.

It is probable that most mineral waters drawn from a great depth are radioactive. Some are active for a very brief period, because they contain merely radium emanations; while others are active for a very long time because they contain dissolved radium salts. All of the twelve Saratoga waters tested showed radioactivity. Of this feature the following statement is made, concerning five of these waters by Messrs. Moore and Whittemore, of the Bureau of Mines of the U. S. Department of Agriculture: "The very large proportion of the radioactivity due to dissolved radium salts is quite exceptional, and * * * it is reasonable to suppose that this statement applies to those not examined for dissolved radium salts."

The residues, or material deposited by the water about the outlets of eight of the springs, are also radioactive, which fact is further evidence of the presence of radium salts.

COMING FACILITIES AT SARATOGA SPRINGS.

Fuller opportunity for proper and most comfortable administration of the CO_2 bath in all varieties, and with skill and exactness, will soon exist for the physicians of this State and of large parts of the country, when the State of New York develops its great plan for the erection of a complete Spa and health resort at

Saratoga, comprising the building of bath houses and a central drink hall, instituting schools for the training of attendants in hydrotherapy and massage, and enhancing the present conditions and environment of the village, in order that the visiting patient may find rest, peace, diversion, "the soft influences of Nature", and skillful medical care and direction conscientiously and scientifically provided.

TABULATED STATEMENT

Of the Results of Analyses of Mineral Waters at Saratoga Springs, N. Y.

Made by the State Department of Health for the Commissioners of the State Reservation at Saratoga Springs.

Chemical Combinations.	Columbian.	Old Red.	New Red.	Magnetic.	Emperor.	Peerless.	Hathorn No. 1.	Hathorn No. 2.	Hathorn No. 3.	Coesa.
Ammonium chlorid	5.15	6.74	10.23	8.27	11.77	13.04	23.35	62.41	48.70	35.83
Lithium chlorid	3.70	8.19	8.53	10.63	24.94	9.18	24.23	76.53	70.82	39.64
Potassium chlorid	82.93	69.22	66.66	61.31	198.70	248.88	508.13	958.50	756.30	609.18
Sodium chlorid	295.59	367.12	817.85	1,032.31	2,429.03	2,249.30	3,011.89	10,652.45	9,124.69	5,043.53
Magnesium chlorid	....	....	....	....	....	....	....	....	....	....
Calcium chlorid	....	....	....	....	....	....	....	....	....	....
Potassium bromid	12.00	3.50	12.00	7.20	17.00	16.00	17.00	69.20	51.66	29.67
Potassium iodid	0.10	0.60	0.10	0.40	0.50	1.20	1.00	3.33	2.10	1.36
Sodium sulphate	59.34	7.91	9.16	14.95	4.88	21.30	17.31	5.18	10.01	8.37
Sodium metaborate	trace	trace	trace	trace	trace	trace	trace	trace	trace	trace
Sodium nitrate	2.13	trace	trace	trace	0.12	trace	trace	trace	trace	trace
Sodium nitrite	trace	trace	trace	trace	trace	trace	trace	trace	trace	trace
Sodium bicarbonate	358.76	362.63	275.32	281.85	169.83	590.16	727.31	697.75	526.32	850.34
Barium bicarbonate	2.09	5.33	5.10	6.62	2.44	6.41	8.00	56.66	34.70	13.56
Strontium bicarbonate	0.23	trace	trace	trace	trace	0.68	trace	2.28	1.14	2.74
Magnesium bicarbonate	416.29	324.70	417.42	512.99	884.58	918.45	1,192.20	2,814.70	2,426.67	1,501.22
Calcium bicarbonate	878.58	768.75	1,111.89	1,099.09	2,069.59	2,059.20	2,176.21	3,991.18	3,504.67	2,786.01
Ferrous bicarbonate	29.21	34.14	39.91	50.88	13.61	12.34	26.66	21.37	18.34	25.48
Mangano-Manganic oxid	none	trace	heavy tr.	none	trace	trace	trace	trace	none	trace
Alumina	3.14	26.58	14.02	1.10	10.79	11.46	21.15	24.41	21.77	1.18
Silica	47.80	51.75	79.40	50.75	13.95	15.00	17.30	17.60	10.50	8.50
Total solids in solution (Computed)	2,227.28	1,968.16	2,928.22	3,129.17	5,851.73	6,202.63	7,771.80	19,483.85	16,608.42	10,956.62
Temperature	8°C.	11.1°C.	11.6°C.	11.1°C.	10°C.	9.5°C.	10.6°C.	11°C.	....	10°C.
Date of taking sample	1913 April 9	1912 Aug. 14	1912 July 17	1912 Feb. 7	1912 June 19	1913 April 2	1913 May 28	1913 April 30	1913 Feb. 6	1912 Dec. 13

TABULATED STATEMENT—Concluded.

Chemical Combinations.	Adams.	Zakana.	Alnoba.	Minronebe.	Geyser.	Pump well No. 1	Flat well No. 2.	Ditch well No. 2.	New Shoot.	Island
Ammonium chlorid	31.96	21.39	6.24	30.97	39.40	8.54	57.13	6.18	68.55	33.82
Lithium chlorid	31.17	11.42	7.10	7.61	16.75	5.87	31.63	11.27	23.30	27.47
Potassium chlorid	696.79	239.82	138.47	292.48	216.81	119.88	508.48	77.50	150.66	126.81
Sodium chlorid	5,165.89	1,002.38	616.20	1,193.93	1,974.08	1,339.84	6,170.17	1,802.89	5,959.89	3,958.18
Magnesium chlorid	.....	.....	.....	.....	.....			182.13	1,573.51	
Calcium chlorid	.....	.....	.....	.....	.....				377.24	
Potassium bromid	11.00	2.00	1.20	25.00	20.00	10.00	38.50	5.00	85.00	21.00
Potassium iodid	2.20	0.30	0.20	1.25	1.00	1.10	1.90	0.40	3.00	1.00
Sodium sulphate	4.10	7.30	7.00	5.78	19.36	11.13	4.26	7.91	9.78	12.17
Sodium metaborate	trace	trace	trace	trace	trace	trace	trace	trace	trace	trace
Sodium nitrate	0.12	trace	trace	trace	trace	trace	trace	trace	trace	0.24
Sodium nitrite	0.015	trace	trace	trace	trace	trace	trace	trace	trace	trace
Sodium bicarbonate	389.36	1,312.16	308.32	1,726.13	2,238.22	103.11	879.11			772.01
Barium bicarbonate	21.78	7.12	1.14		7.78	7.11	12.41	2.22	120.30	11.33
Strontium bicarbonate	4.56	1.14	1.37	trace	4.14	trace	3.66	none	1.00	3.66
Magnesium bicarbonate	1,672.16	161.48	305.41	591.36	704.24	505.99	1,499.91	1,008.71		1,221.22
Calcium bicarbonate	2,666.83	2,229.19	1,137.96	1,155.96	1,728.78	1,119.77	2,786.01	1,531.73	1,713.11	2,572.71
Ferrous bicarbonate	20.00	15.03	13.90	17.19	30.08	16.29	789.11	29.27	26.72	22.07
Mangano-manganic oxid	trace	none	none	trace	heavy tr.	trace	trace	none	trace	trace
Alumina	10.63	8.41	5.37	6.15	4.48	10.30	132.59	23.72	28.02	7.00
Silica	12.06	11.15	11.60	31.00	11.86	9.20	56.55	73.55	18.35	10.05
Total solids in solution (Computed)	10,876.57	5,333.21	2,564.78	5,084.94	7,023.92	3,898.67	13,242.18	1,766.08	12,910.13	8,701.73
Temperature	11°C.	10°C.	10.5°C.	10°C.	10°C.		10.5°C.		10°C.	11°C.
Date of taking sample	1913 May 11	1912 Dec 16	1912 Dec. 16	1913 July 10	1912 July 3	1912 July 18	1912 Oct. 9	1912 Sept. 19	1913 March 10	1912 Oct 23

The results of the analyses are expressed in milligrams per liter. The waters of all the springs are, at normal atmospheric temperature and pressure, supersaturated with carbonic acid gas.

AN ACT

CREATING THE

STATE RESERVATION AT SARATOGA SPRINGS

Being Chapter 569 of the Laws of the State of New York, passed in the year 1909, and the various amendments thereto and the other acts relating to said Reservation, down to and including the year 1914.

AN ACT to authorize the selection, location and appropriation of certain lands in the town of Saratoga Springs, for a state reservation, and to preserve the natural mineral springs therein located, and making an appropriation therefor, and authorizing an issue of bonds to pay such appropriation.

Became a law May 29, 1909, with the approval of the Governor. Passed by a two-thirds vote.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

Commissioners of Reservation. appointment.

Section 1. Within ten days after the passage of this act, there shall be appointed by the governor, by and with the consent of the senate, three commissioners, each of whom shall be a resident of the state of New York, and such persons thus appointed are hereby constituted a board under the name and style of "The Commissioners of the State Reservation at Saratoga Springs." Each of said commissioners shall hold office for the term of five years from the time of his appointment and until another is appointed in his place. No member of said board shall receive any compensation for his services, but each commissioner shall be entitled to receive his actual disbursements for his expenses in performing the duties of his office. In case of a vacancy in said board, it shall be filled by appointment by the governor, and the person appointed to such vacancy shall hold his office for the term of five years from the time of his appointment, and until another shall be appointed in his place.

Terms.

No compensation.

Disbursements.

Filling vacancies.

Board to acquire lands and interests therein.

Maps of lands selected.

Conveyance.

Agreement as to price.

§ 2. It shall be the duty of said board, and it shall have power, from time to time, but subject to the conditions and restrictions hereinafter contained, to select and locate such lands in the town of Saratoga Springs, in the county of Saratoga, or in any adjoining town and any rights, easements, or interest upon or in any lands, in said town, or towns, as it shall deem proper and necessary to be taken for the purpose of establishing a state reservation, of preserving the natural mineral springs in said town of Saratoga Springs and adjoining towns, and of restoring said springs to their former natural condition, and for that purpose, to acquire any rights, easements, or interest in any property, the whole of which it shall not acquire, for the purpose of protecting the springs or mineral water rights upon any lands it shall acquire, provided, however, that said board shall not at any time acquire lands, easements, or interests, just compensation required to be made for which shall exceed the amount of all unexpended appropriations properly applicable thereto. Said commissioners shall, from time to time, cause to be made by the state engineer and surveyor maps of such lands which, or rights and easements in which, it shall determine to take, which maps shall be certified by a majority of such commissioners and filed in the office of the secretary of state and in the Saratoga county clerk's office, and shall specify with respect to each piece of such land, whether the whole title thereof is to be taken, and if the whole is not to be taken, the rights, easements, or interests therein, that are taken. The said board may accept from the owner or owners of any such lands, rights, easements, or interest a proper conveyance thereof to the state, at any time, and may agree with the grantor or grantors upon the fair value of and the price to be paid for the lands, rights, easements, or interests conveyed. From the time of the filing of any such map, or the delivery of such conveyance, where no map has been filed, the title of the lands, or rights, easements, or interests therein specified, shall become and be the property of the state of New York, and shall constitute a portion of the reservation herein provided for; and the state may also acquire for the same purpose any lands or other property by gift, grant, assignment, devise, or bequest; and no part of the property acquired for such purpose shall be sold or aliened without the consent of the legislature, except by concession granted and limited as hereinafter provided.

As amended by Laws of 1911, Chapter 394, Section 1.

§ 3. Said board, by a majority vote of its members, shall have the power, at any time after the filing of any such map, to fix and determine with each and any of the respective owners of any lands, rights, easements, or interest specified on such map thus filed, upon the fair value of such lands, rights, easements, or interest, and may agree upon a price to be paid therefor by the state, and accepted by said owners, respectively, and the amount thus agreed upon shall be audited by the comptroller and shall be paid therefor by the state treasurer, upon the certificate of said board, and upon the written approval of the governor, out of any funds appropriated for that purpose. In case said board shall not agree with any owner, or owners, of said lands, rights, easements, or interest, within sixty days from the filing of such map specifying such property, then such owner, or owners, may recover judgment for the value thereof in the board of claims, as a claim against the state.

As amended by Laws of 1914, Chapter 252, Section 1.

Purposes for which reservation to be maintained.

§ 4. The reservation property, with all the lands, springs, wells, rights and easements included therein, shall forever remain and be kept, maintained and used for the purpose of restoring to their natural state and purity and preserving the said springs and wells and the natural flow of waters and gases therefrom; and of promoting the resort to the said springs of the people of the state for health, and the other suitable use of the said reservation by the people; and of identifying, safeguarding and assuring the natural purity, qualities and repute of such waters and gases; and for the purpose of providing the said waters to the people for drinking free of charge.

As amended by Laws of 1911, Chapter 394, Section 2.

Care and control of reservation.

§ 5. Said board shall have the care, custody and control of said reservation, and of all the mineral springs, wells, mineral water and natural carbonic acid gas thereon, therein, or thereunder, and of all the rights, easements, and interests acquired

Provision for free drinking of waters.

Leases or concessions.

Sale of excess water and gas.

Violations.

Power of board to bring actions.

Employment of experts, etc.

by it. The said board shall make reasonable provision for the free drinking of said waters at points as near as shall be convenient to the respective sites of the springs producing said waters; it may prescribe and publish and enforce all proper regulations for the maintenance and care and protection of said properties, and for the distribution and proper use of said springs, wells, waters and gases and for the other maintenance, care and protection of said reservation. The board may, for proper rentals or other payment and upon other proper terms, grant leases or concessions for the use of any portion of the said land, waters or gases; but every such lease, concession or use shall by its terms be subject to reasonable provision for the free drinking of such waters and shall provide that the use by the lessee, concessionee or concessionees of any property or right included in the state reservation shall be at all times subject to the reasonable regulations of the board, and that all users of the waters, gases, lands or interests by the lessee, concessionee or concessionees shall be subject at any time to the free inspection of the board and its representatives. The board may prescribe the terms upon which any excess of mineral water and gas not used on said reservation, or used under such concessions, shall be sold or distributed and shall prescribe the names, labels and advertisements to be affixed to the bottles or other vessels containing such waters or gases or to be published; and the said board may itself sell or dispose of such excess of water. The violation of any reasonable regulation of said board shall be a misdemeanor and shall be punishable as such. The board may, in the name and behalf of the state, bring any proper suit or action, in equity or at law, whether within or without the state, to protect and enforce the repute of the said springs or wells or the waters or gases thereof, or to prevent any corruption, pollution, impairment, diversion or depletion thereof or interference therewith, or to prevent the unauthorized or unfair use of the name or certificate of the state, or any such publication or use of any label or advertisement with reference to said waters or gases or any other waters or gases sold or distributed or sought to be sold or distributed as such. The said board may employ such experts, curator, attorneys, counsel and employees and do such things as shall be found necessary from time to time to maintain, administer, restore, preserve and protect the state reservation and any and all of its lands, easements and interests. The said board shall annually make a report to the legislature setting forth the general situation and state of the said reservation, the proceedings of the board and its receipts and expenditures. All sums received by said commission shall be paid into the state treasury, and all the expenses of said commission shall be paid upon the warrant of the comptroller; it shall report in writing each year to the legislature, specifying, in detail, its receipts and expenditures for such year.

Annual report.

Finances.

As amended by Laws of 1911, Chapter 394, Section 3.

Appropriation.

§ 6. The sum of nine hundred and fifty thousand dollars ($950,000) or so much thereof as may be needed, is hereby appropriated for the purchase of such lands, rights, easements and interest by said board, including the cost of preliminary surveys of the lands taken and the lands in which easements are taken and the expense of the examination and certification of title and other expenses incident to the acquisition of title by the state, and the payment of any judgments that may be recovered therefor in the court of claims as hereinbefore provided. The state comptroller, upon the written request of such board, is hereby authorized and directed to borrow not more than nine hundred and fifty thousand dollars for the purposes specified in this act, and to issue bonds or certificates of the state therefor payable within ten years from their date, bearing interest at a rate not exceeding five per centum per annum, and which shall not be sold at less than par. The sum hereby appropriated shall be payable on the order of such board, and upon the written approval of the governor, by the treasurer on the warrant of the comptroller, only out of the moneys realized from the sale of such bonds or certificates.

Bond issue.

Sum appropriated, how paid.

As amended by Laws of 1911, Chapter 394, Section 4.

Commissioners incorporated. Corporate name. Powers relative to sale and use of mineral waters.

§ 7. The said commissioners and their successors are hereby constituted a body corporate under the name of the board of commissioners of the state reservation at Saratoga Springs, for the following purposes: First. To adopt, compose, invent or devise any and every mark, name or device which they may see fit to use in connection with the sale and use of any of the mineral waters of said reservation and to register and file descriptions thereof as trade marks or trade names, or otherwise, for the protection thereof or to secure the exclusive right to the use thereof under any laws or statutes of the state of New York, or of the United States of America, or any other state or country where the sale of such waters may be carried on; and in said corporate name to institute and prosecute any and all suits, actions and other proceedings to restrain or recover damages or penalties for the unauthorized use thereof by any other persons or corporations. Second. To institute in their said corporate name and prosecute any and all suits, actions and other proceedings under the laws of the state of New York or under the laws of the United States of America against any persons or corporations for the violation of any such law for the regulation of the sale of mineral waters or for the prevention of the adulteration thereof and to sue for and recover any penalties which may be imposed for a violation of any such law, for the recovery of which the attorney-general of the state of New York shall bring an action within thirty days after a written statement of the fact of such violation has been presented to him by the said board. Third. To have, possess, use, exercise and enjoy any and all other powers conferred upon corporations in this state by the general corporation law and which are not inconsistent with the provisions of this act.

Power to prosecute actions for violation of regulations of sale or adulteration.

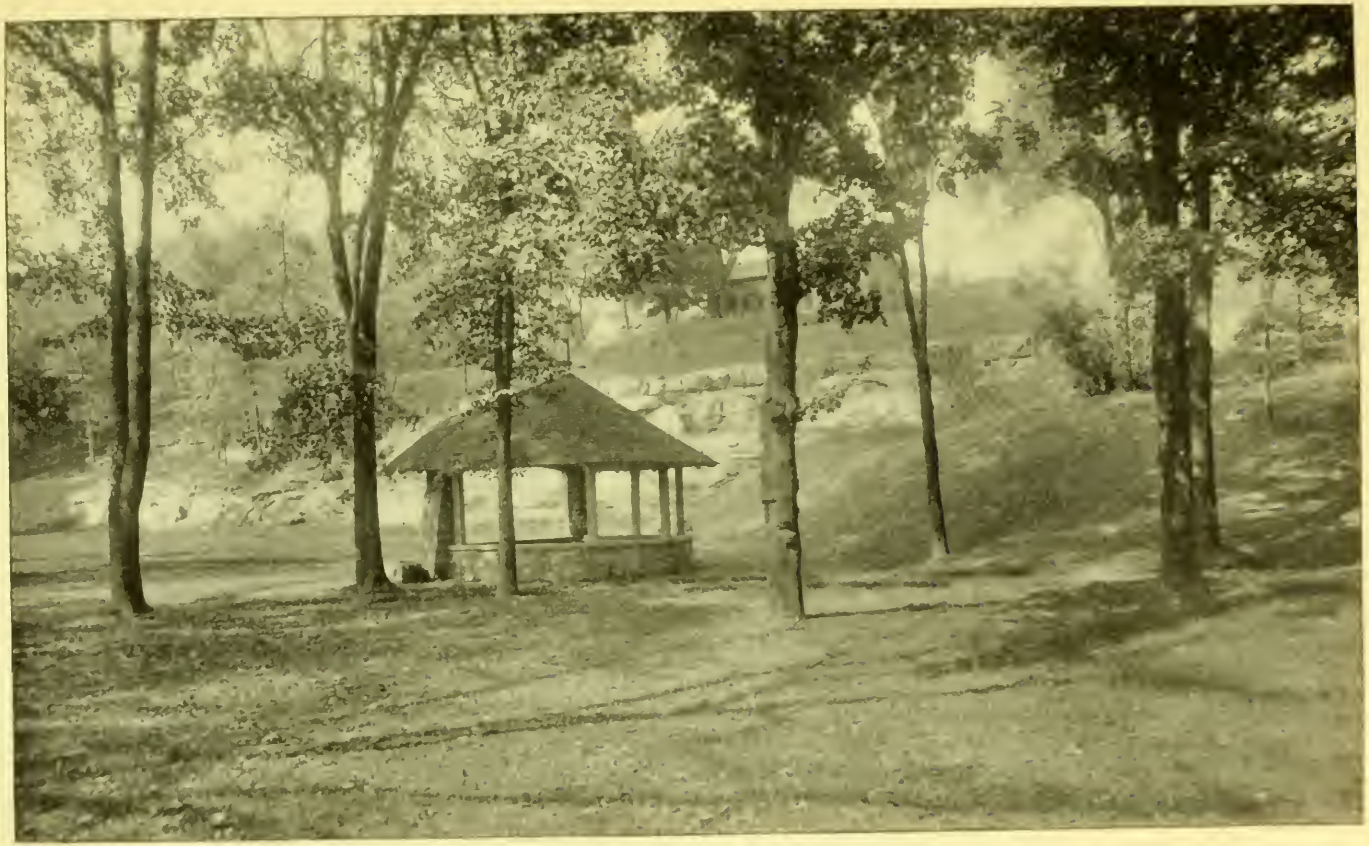
General powers.

New section added by Laws 1911, Chapter 394, Section 5.

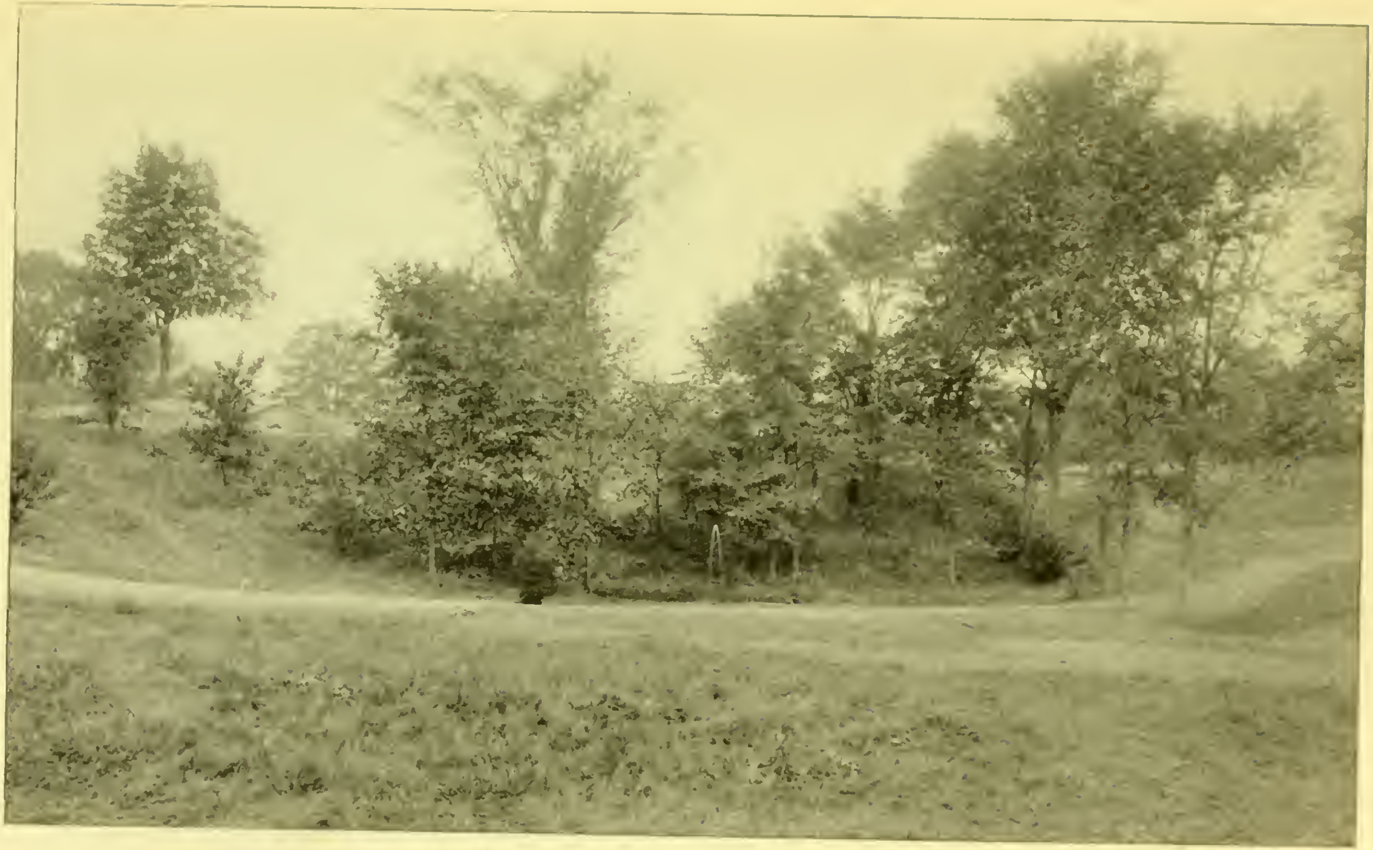
§ 2. All agreements, heretofore made by said board with the owner or owners of any lands, rights, easements or interests acquired for said reservation, fixing or determining the fair value thereof or the price to be paid therefor by the state, after the expiration of sixty days from the filing of the maps thereof, are hereby approved, ratified and confirmed and declared as valid and effectual for all purposes as if made within said period of sixty days.

Laws 1914, Chapter 252.

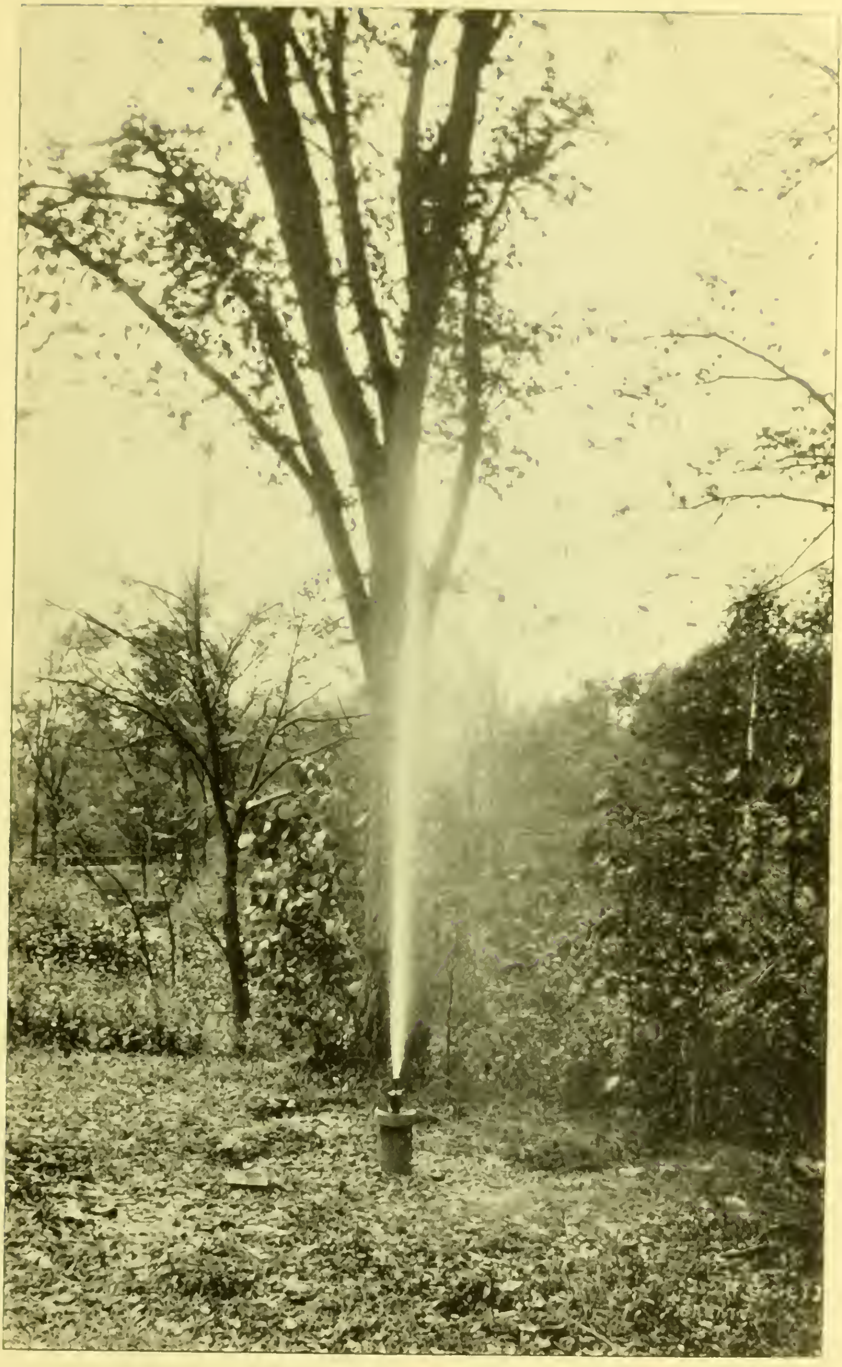
Music 'neath the arching elms of Congress Park.



New Pavilion sheltering the High Rock tufa cone, near the dolomite scarp of the geologic Fault, the site of the High Rock Spring, revealed by the Indians in 1767.



View in Diondaroga, " Vale of Springs," Geyser Park, showing one of the spouting springs.

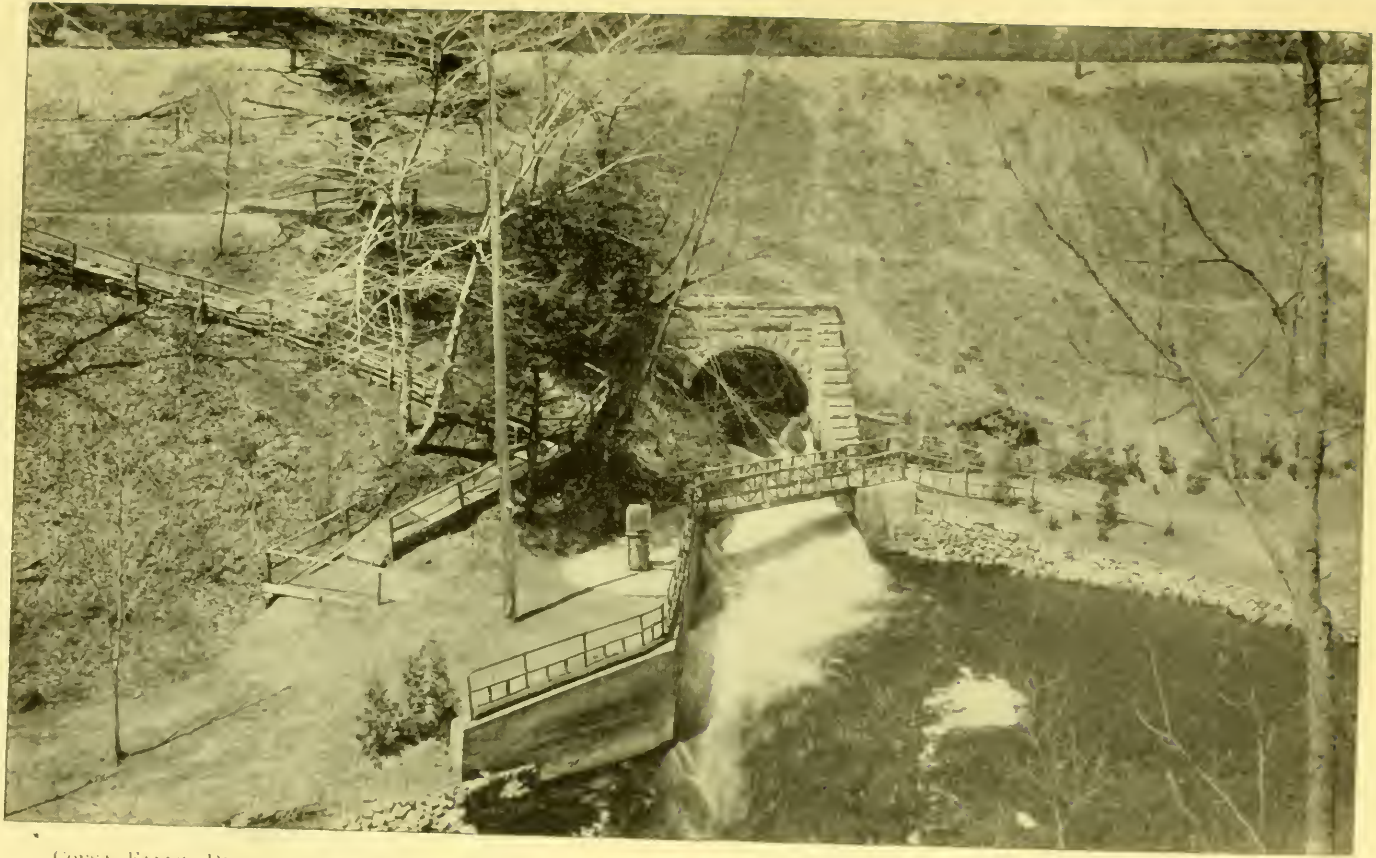


Another of the several spouting springs in Geyser Park.

Picturesque ice formation at the Island Spouting Spring.

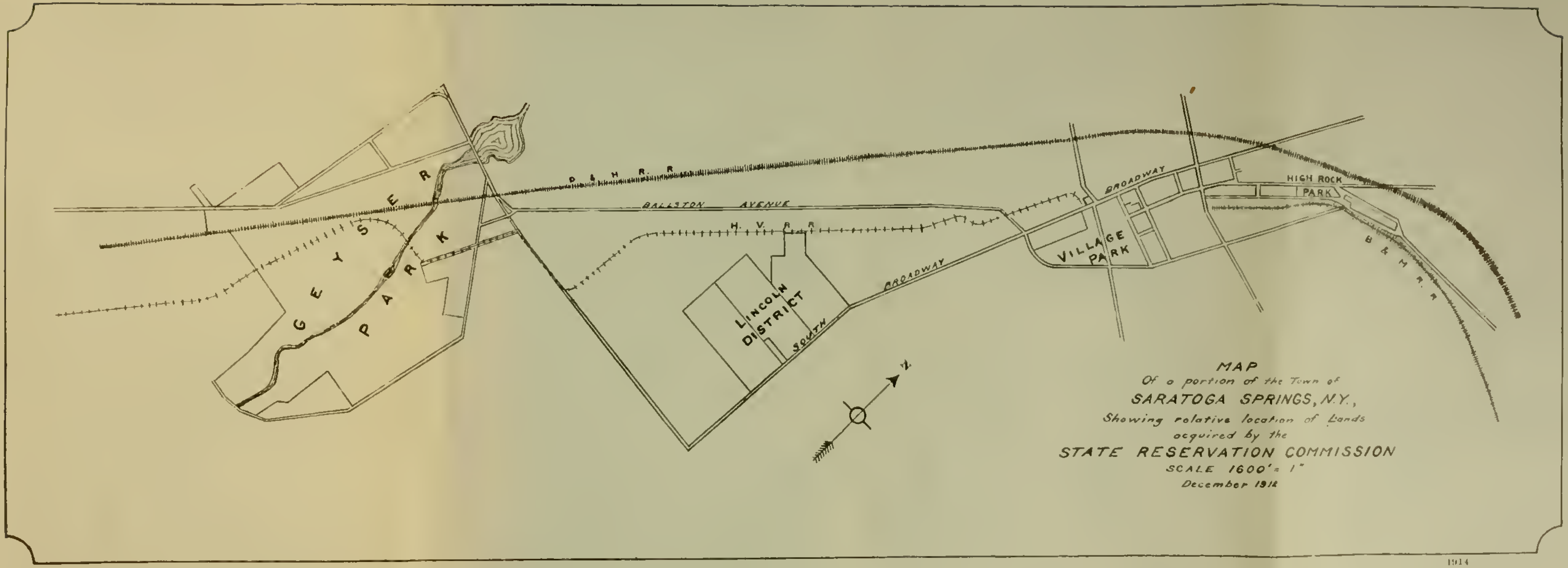
A bit of scenery in Coesa Valley, below Diondaroga, Geyser Park.

Supplement to preceding view, looking up Coesa Creek.



Coesa Falls, Diondaroga — "Vale of Springs." An example of the inexpensive rustic work and landscape treatment used in the development of Geyser Park.

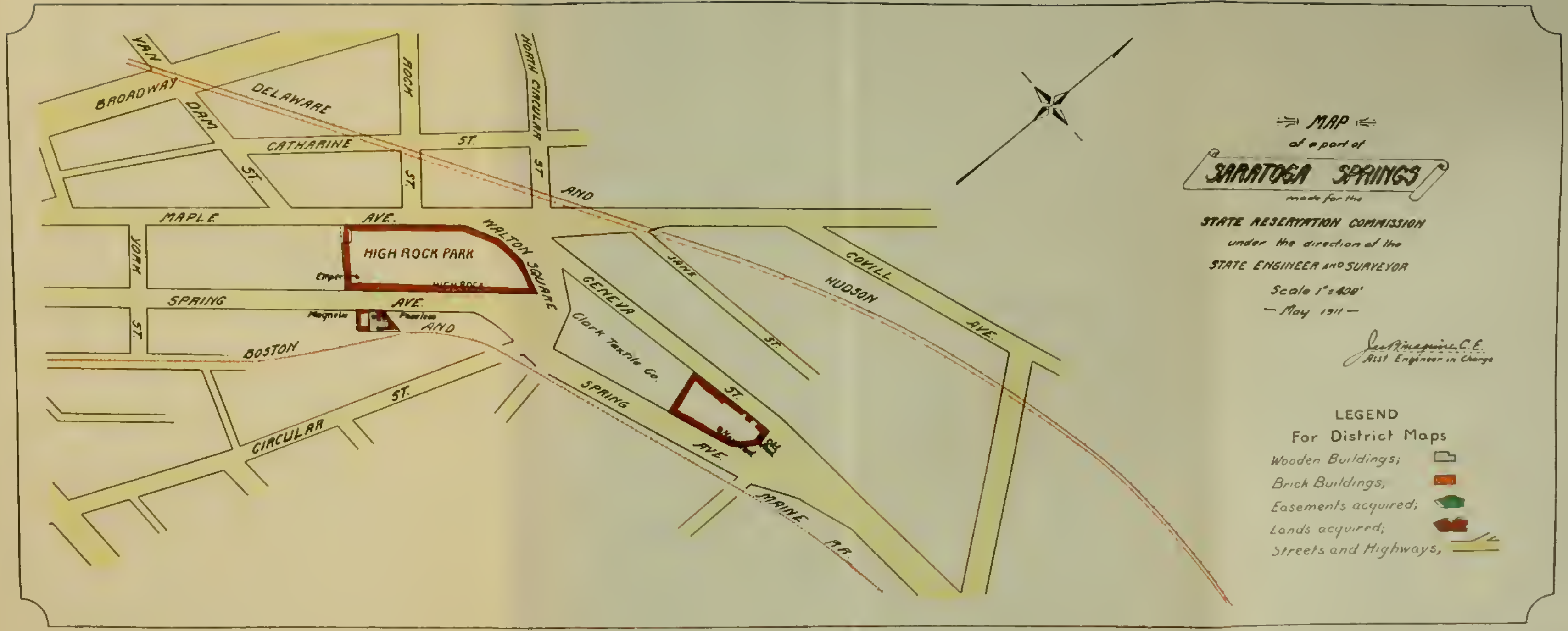
Map No. 1



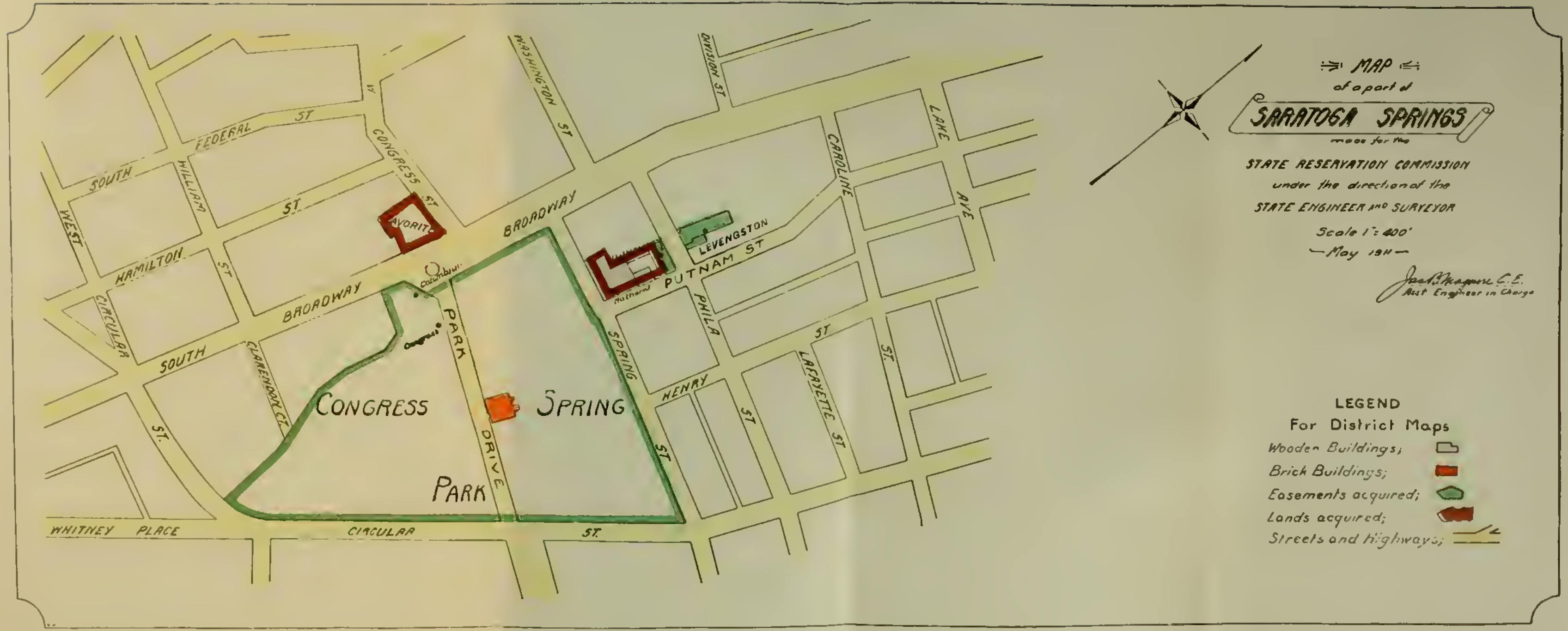
MAP
Of a portion of the Town of
SARATOGA SPRINGS, N.Y.,
Showing relative location of Lands
acquired by the
STATE RESERVATION COMMISSION
SCALE 1600' = 1"
December 1912

1914

Map No. 2


MAP
of a part of
SARATOGA SPRINGS
made for the
STATE RESERVATION COMMISSION
under the direction of the
STATE ENGINEER AND SURVEYOR
Scale 1" = 400'
— May 1911 —
C.E.
Asst Engineer in Charge
LEGEND
For District Maps
Wooden Buildings;
Brick Buildings,
Easements acquired;
Lands acquired;
Streets and Highways,
VAN DAM ST.
BROADWAY
DELAWARE
CATHARINE ST.
ROCK ST.
NORTH CIRCULAR ST.
AND
MAPLE AVE.
YORK ST.
HIGH ROCK PARK
Emperor
HIGH ROCK
WALTON SQUARE
SPRING AVE.
Magnolia
Peerless
AND
BOSTON
CIRCULAR ST.
GENEVA ST.
Clark Textile Co.
SPRING AVE.
JANE ST.
HUDSON
COVILL AVE.
MAINE R.R.

1914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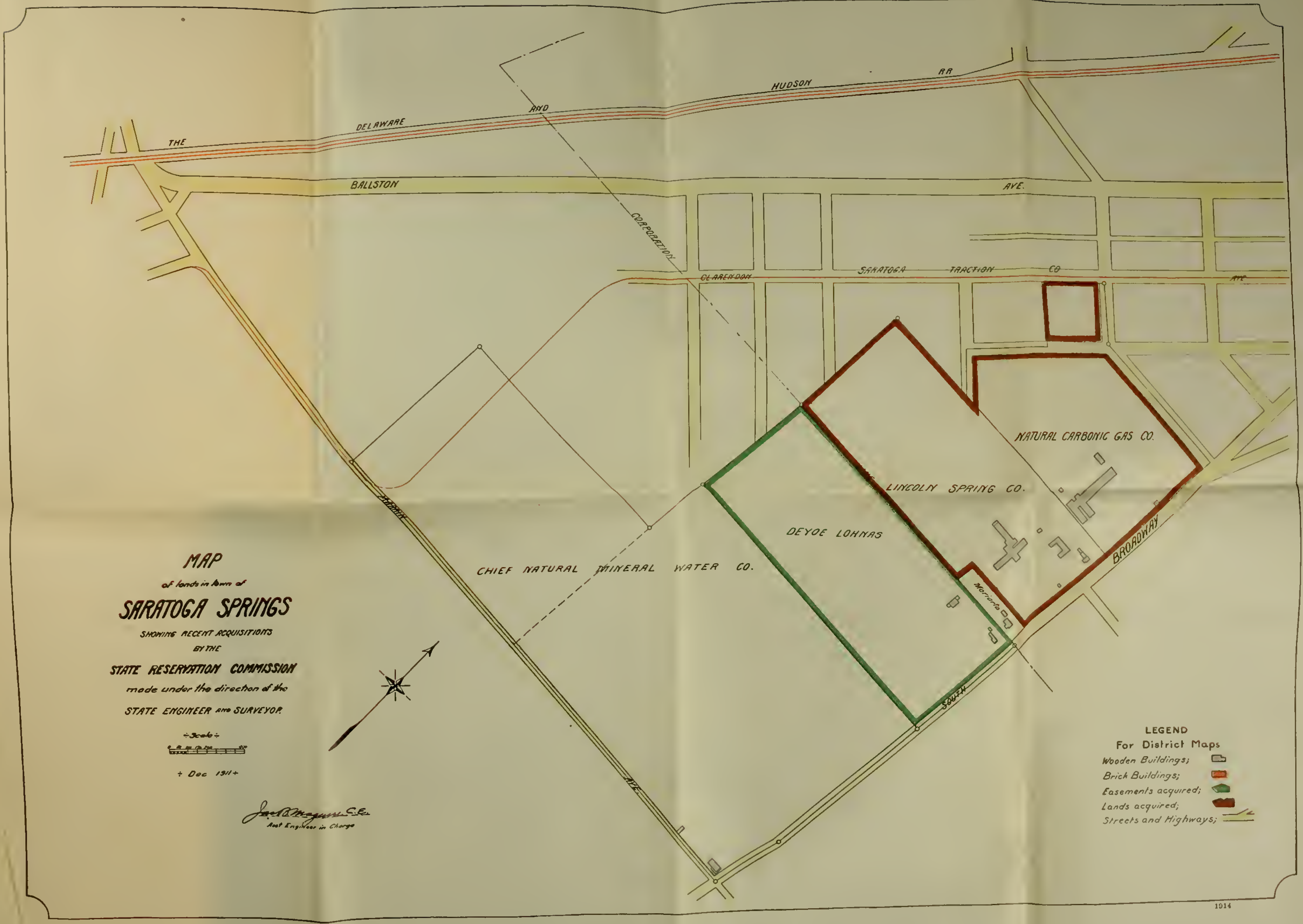
Streets and Highways;
CONGRESS
SPRING
PARK
PARK DRIVE
BROADWAY
SOUTH BROADWAY
SOUTH FEDERAL ST
CONGRESS ST
WILLIAM ST
HAMILTON ST
WEST CIRCULAR ST
CLARENDON CT.
WHITNEY PLACE
CIRCULAR ST.
WASHINGTON ST
DIVISION ST
SPRING ST
PUTNAM ST
LEVENGSTON
PHILA ST
HENRY ST
LAFAYETTE ST
CAROLINE ST
LAKE AVE
FAVORITE
Columbian
Congress
Rutherford

Map No. 4



MAP

of lands in town of

SARATOGA SPRINGS

SHOWING RECENT ACQUISITIONS

BY THE

STATE RESERVATION COMMISSION

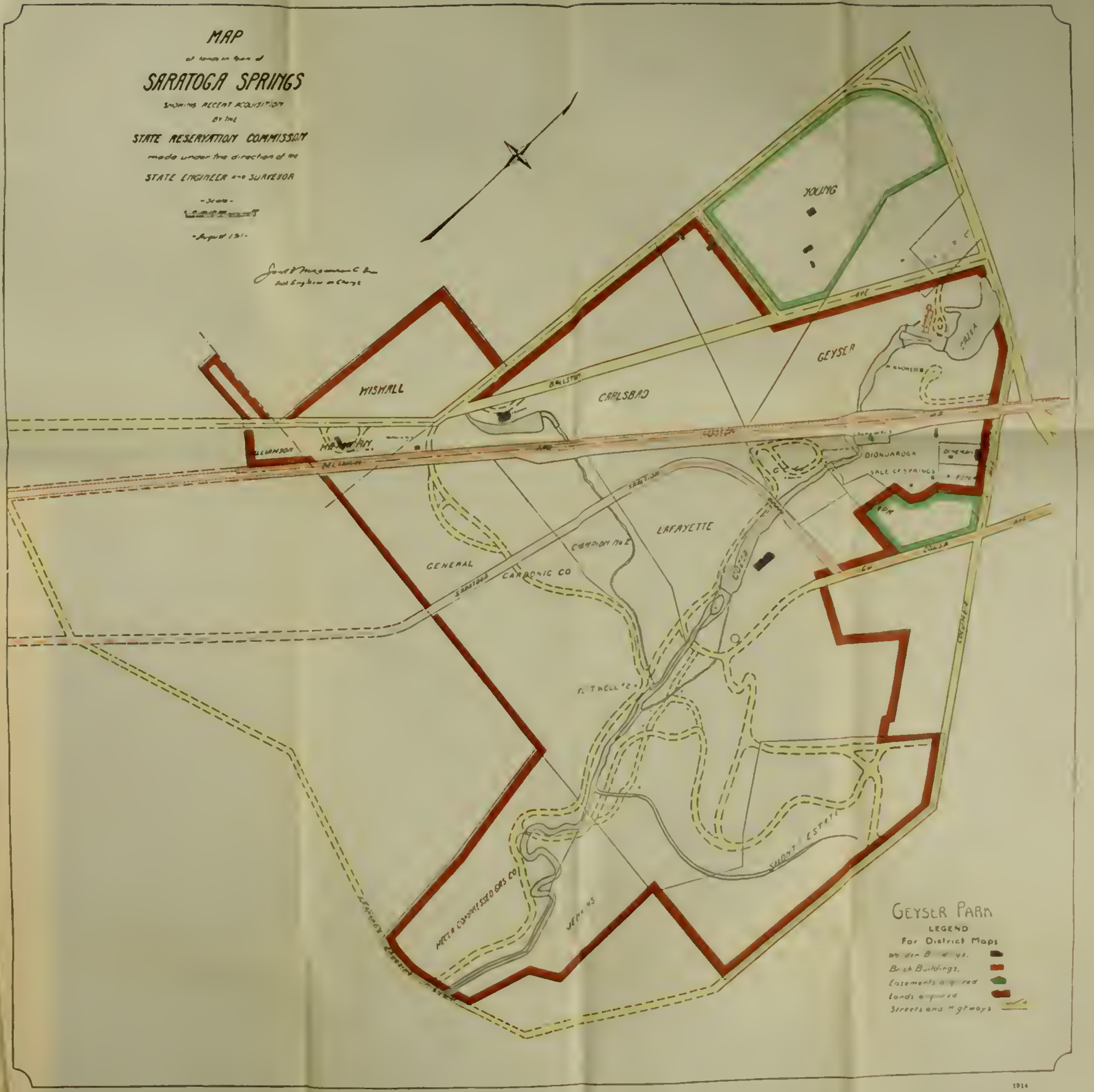
made under the direction of the

STATE ENGINEER AND SURVEYOR

÷ Doc 1911 ÷

C.E.
Asst Engineer in Charge

1914


MAP
of lands in town of
SARATOGA SPRINGS
showing recent acquisition
by the
STATE RESERVATION COMMISSION
made under the direction of the
STATE ENGINEER and SURVEYOR
- Scale -
- August 1914 -
Asst Engineer in Charge
YOUNG
GEYSER
CARLSBAD
BALLSTON AVE
WISHALL
HATHORN
WILLIAMSON
BELLINGER
LAFAYETTE
DIONDAROGA
VALE OF SPRINGS
CRISTA
GENERAL
CARBONIC CO
SARATOGA
CARBON No. 2
GEYSER
CO AVE
SHORT ESTATE
JENKINS
HETLA CONDENSED GAS CO
GEYSER PARK
LEGEND
For District Maps
Wooden Buildings.
Brick Buildings.
Easements acquired
Lands acquired
Streets and Highways

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